



5.22 *Managed Lands and Natural Areas*

For purposes of this section, Preferred Alternative 8 that was identified in the Draft Environmental Impact Statement (DEIS) will be referred to as “Alternative 8.” The Preferred Alternative for the Final Environmental Impact Statement (FEIS) will be referred to as the “Refined Preferred Alternative 8.”

Since the publication of the DEIS, the following substantive change has been made to this section:

- **Section 5.22.3, *Analysis*, and Table 5.22-1** have been updated to include impacts for Refined Preferred Alternative 8.
- **Section 5.22.3.5, *Managed Land Impacts*** - Boundaries and impacts for Wapehani Mountain Bike Park and Mill Creek Easement have been updated based on consultation with the City of Bloomington.

5.22.1 Introduction

Managed lands include forests, recreation areas, natural areas, nature preserves, and other federal and state lands that are managed for conservation, recreation, resource extraction, or other purposes. Some of the federal or state owned managed lands in Southern Indiana include Naval Surface Warfare Center, Crane Division; Hoosier National Forest; and, Morgan-Monroe State Forest. In Monroe and Morgan counties, publicly managed lands include Morgan-Monroe State Forest. In addition, Beanblossom Bottoms Nature Preserve is privately owned by the Sycamore Land Trust but is managed by the United States Fish and Wildlife Service (USFWS).

Some private lands are also considered “managed lands.” These areas may also be designated as high quality natural areas or for another specific purpose where they are not necessarily actively managed. These lands may be managed for timber production, wildlife habitat, recreation, education, or other purposes. Federal and state interests exist with many of these lands, including cost-sharing agreements, purchased easements, or property tax reductions. Federal and state funds have been or are being expended on many of these properties.

Privately-owned managed lands investigated for this study include properties enrolled in the following government cost share programs, which generally are geared toward managing resources for conservation purposes:

- United States Fish and Wildlife Service
 - Partners for Fish and Wildlife Program
- United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS)
 - Wetlands Reserve Program (WRP)
 - Grasslands Reserve Program (GRP)
 - Wildlife Habitat Incentives Program (WHIP)
 - Environmental Quality Incentive Program (EQIP)

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- USDA Farm Services Agency (FSA)
 - Conservation Reserve Program (CRP)
 - Conservation Reserve Enhancement Program (CREP)
- Indiana Department of Natural Resources (IDNR)
 - Classified Forest and Wildlands Program (CFWP)
 - Game Bird Habitat Development Program (GBHDP)

Section 5 of I-69 entails upgrading an existing multi-lane, divided transportation facility to a full freeway design. The majority of the right-of-way used for the Section 5 project already is devoted to transportation use. Accordingly, the impacts to most natural resources in Section 5 will be lessened (on a per-mile basis) in comparison to Sections 1 through 4, which are being constructed on new terrain. The resource impacts in this chapter include only those outside of the existing rights-of-way for SR 37 and other transportation facilities.

5.22.2 Methodology

Managed lands play an important role in preserving and protecting plant and animal species. For purposes of this study, managed lands include all of the following: all outdoor recreational facilities; all publicly managed lands; and, all private properties whose owners participate in federal, state, and local wetland, habitat, or other conservation and management programs. These lands were identified within the corridor based on Geographic Information Systems (GIS) mapping, field reviews and coordination with resource agencies.

Coordination was undertaken with appropriate federal and state agencies to determine whether properties within the Section 5 corridor are enrolled in managed lands programs such as those listed above.

The following sections describe the results of agency coordination, managed land activities identified in the project corridor, potential impacts to the areas as a result of the project, and mitigation for impacts.

5.22.3 Analysis

Coordination with appropriate agencies concluded no properties exist within the Section 5 corridor that are currently enrolled or have participated in the Partners for Fish and Wildlife Program, WRP, GRP, WHIP, EQIP, CREP, or GBHDP. No USFWS owned or funded lands were identified within the project corridor. The Beanblossom Bottoms Nature Preserve, which is managed by the USFWS, is beyond the limits of the study corridor. No state wildlife management areas will be impacted by the project. No properties acquired or improved with Pittman-Robertson or Dingell-Johnson funds are known to be impacted by any of the alternatives.

Section 4.3.3.4, *Managed Lands/Natural Areas*, identified 20 total managed lands that would be affected by I-69 alignments and/or are located in the Section 5 corridor. Of this total, five are publicly-managed (not all are publicly owned), and 15 are privately owned/privately managed land properties which participate in other state and/or federally funded programs, as described



below. The relationship of managed land properties to the Section 5 corridor and I-69 alternatives are shown on **Figure 5.22-1** to **Figure 5.22-9** (located at the end of this chapter). The impacts to these managed lands are enumerated in **Table 5.22-1** (see **Section 5.22.5, Summary**).

5.22.3.1 Morgan-Monroe State Forest

The Morgan-Monroe State Forest (labeled as Public-11 on **Figure 5.22-7** and **Figure 5.22-8**) is located within the Section 5 corridor. The Morgan-Monroe State Forest encompasses over 25,000 acres in Morgan and Monroe counties. The State Forest was designated in 1929 and is comprised of crested ridges and valleys. The forest offers various family-oriented outdoor activities including picnic shelters, hiking trails, three fishing lakes, primitive camping, and hunting for white tail deer, ruffed grouse, turkey, squirrel, fox, and raccoon during the appropriate seasons. Most of the area under State Forest management is listed as public use, which can include recreational and various timber and wildlife harvesting activities. Comments from the Morgan-Monroe State Forest on the DEIS stated preference for Alternative 8, subject to access and directional signage being included in design. The following features of Alternative 8 are committed to as part of the Refined Preferred Alternative:

- A local access road that connects the Sample Road Interchange with Chambers Pike will provide visitor access from the south.
- The overpass at Chambers Pike will provide access to forest property on the west side of SR 37/I-69.
- A local access road that connects Liberty Church Interchange with Old 37 will provide visitor access from the north.
- Directional signage will be provided from Liberty Church and Sample Road Interchanges to direct visitors.
- A local access road will be provided between Burma Road and Chambers Pike to maintain access to forest property on both sides of SR 37/I-69.

5.22.3.2 Local Community Parks and Open Space

The City of Bloomington manages parks and recreation areas to provide essential services, facilities, and programs necessary for positive development and well-being of the community. Wapehani Mountain Bike Park is located along Weimer Road in southwestern Bloomington adjacent to SR 37, and is located within the Section 5 corridor. It is comprised of two parcels, with the northern parcel being owned by the City of Bloomington (labeled as Public-2 on **Figure 5.22-2**), and the southern parcel being owned by the Bloomington Community Parks and Recreational Foundation. While the parcels are owned by two independent entities, the City promotes and manages the site as a combined facility.



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The Wapehani Mountain Bike Park was the first mountain bike park in the state of Indiana. The Monroe County GIS database indicates the City's northern parcel is approximately 32.77 acres and the park's southern parcel is approximately 12.66 acres, for a total of 45.43 acres.¹ The park includes a small lake (former public water reservoir) known as Weimer Lake, which was created by placement of an earthen dam across an unnamed stream. In the park, there are fringe wetlands, woods, springs, sinkholes, and five miles of bike trails with minor wooden trail features (bridges, walkways, jumps, etc.). In addition, the lake receives runoff/storm water from commercial development and the existing SR 37 to the west.

The Mill Creek Conservation Easement (labeled as Public-1 on **Figure 5.22-2**) is located adjacent to and south of Wapehani Mountain Bike Park. It is privately owned by the Public Investment Corporation, but managed by the City of Bloomington for habitat conservation purposes.

Brown's Woods (labeled as Public-3 and Public-4 on **Figure 5.22-3**) consists of two woodland parcels on either side of Basswood Drive and east of SR 37, in a developing area of the city. The property was donated under a Memorandum of Understanding to the Community Foundation of Bloomington and Monroe County, Inc. (Foundation) to preserve it, in perpetuity, as undeveloped land for the benefit of wildlife, plant communities, and the general public. The property is privately owned by the Community Real Estate Holdings, LLC, a holding company for the Foundation. The City of Bloomington Parks and Recreation Department maintains the property as a woodland under a Lease Agreement with the Foundation.²

5.22.3.3 USDA-NRCS Conservation Reserve Program

The CRP is administered through the FSA. Program support is provided by NRCS, Cooperative State Research and Education Extension Service, state forestry agencies, and local Soil and Water Conservation Districts. The CRP is a voluntary program for agricultural landowners, through which property owners can receive cost-share assistance to establish long-term, resource-conserving covers on eligible farmland. Participants enroll farmlands in CRP for 10 to 15 years. The Section 5 study corridor includes five properties enrolled in the CRP and one beyond the study corridor that could be affected by I-69 alignments (see **Figure 5.22-4** and **Figure 5.22-5** for locations of the CRP resources).

¹ Acreage obtained from the Monroe County, Indiana eGIS system, available electronically. (Source: 39 Degrees North, "Monroe County, Indiana," eGIS, <http://monroein.egis.39dn.com/#> [accessed September 19, 2012]). Note that the City of Bloomington Wapehani Mountain Bike Park website states the park includes 45.98 acres. (Source: The City of Bloomington, "Wapehani Mountain Bike Park," <http://bloomington.in.gov/wapehani-mountain-bike-park> [accessed September 19, 2012]).

² Personal communications, Renee Chambers with the Community Foundation, January 23, 2013 and March 23, 2013.



5.22.3.4 IDNR Classified Forest and Wildlands

The CFWP, operated by the IDNR, encourages timber production, watershed protection, and wildlife habitat management on private lands in Indiana. This program is available to landowners with at least 10 contiguous acres supporting growth of native or planted trees, native or planted grasslands, wetlands, or other acceptable types of land cover that have been set aside and managed for the production of timber, wildlife habitat, and watershed protection. In return for meeting program guidelines, landowners receive property tax modifications, literature regarding forestry practices, and periodic free inspections by a professional forester while the property is enrolled in the program.

The lands are eligible for assessment at \$1.00 per acre and taxes are paid on that assessment. The owner of classified forest and wildlands does not relinquish ownership or control of his property, and the IDNR Division of Forestry does not become connected in any way with ownership of the land. Part or all of the classified forest and wildlands can be withdrawn from classification at any time by completing and recording the withdrawal forms provided by the district forester upon request. When a part of classified forest is withdrawn, the remaining area must be a minimum of 10 acres. If it is less than 10 acres, then the whole tract must be withdrawn. The state forester may also withdraw the land from classification if the requirements of the law are not being met. When withdrawing land from classification, the owner must go to the county assessor and have the assessor complete a report on the real property taxes that would have been paid had the property not been classified.³

If IDNR classified forest and wildlands are acquired for the I-69 project, the INDOT appraiser will consider any liability the property owner may have for back taxes and/or penalties as a factor in the appraisal process. The Section 5 study corridor includes eight properties identified as IDNR classified forest and wildlands and one beyond the corridor that could be affected by I-69 alignments (see **Figure 5.22-1** and **Figures 5.22-6 to 5.22-9** for locations of the CFWP resources).

5.22.3.5 Managed Land Impacts

The following discussions identify the range of anticipated managed lands impacts associated with the six Section 5 alternatives. **Figure 5.22-1** to **Figure 5.22-9** depict managed land impacts associated with these alternatives. Managed land parcels are shaded in green. **Table 5.22-1** lists the impacts by alternative for each managed land.

³ State of Indiana, Division of Forestry, “Indiana Classified Forest and Wildlands program,” Indiana Department of Natural Resources, <http://www.in.gov/dnr/forestry/4801.htm> (accessed September 19, 2012).

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Table 5.22-1: Managed Lands Impacts by Alternatives

Managed Land Parcel Number	Alt 4	Alt 5	Alt 6	Alt 7	Alt 8	Refined Preferred Alt 8
Public-1: 1.70 Managed Acres Mill Creek Easement	0.69	1.60	0.61	1.55	1.11	1.50
<i>Remnant Managed Acres East</i>	1.01	0.10	1.09	0.15	0.59	0.20
Public-2: 45.43 Managed Acres Wapehani Mountain Bike Park	0.00	1.10	0.00	1.73	0.00	1.73
<i>Remnant Managed Acres East</i>	45.43	44.33	45.43	43.70	45.43	43.70
Public-3: 11.01 Managed Acres Brown's Woods	0.82	0.84	0.00	0.00	0.00	0.00
<i>Remnant Managed Acres East</i>	10.19	10.17	11.01	11.01	11.01	11.01
Public-4: 5.61 Managed Acres Brown's Woods	0.00	0.00	0.00	0.00	0.00	0.00
<i>Remnant Managed Acres</i>	5.61	5.61	5.61	5.61	5.61	5.61
CRP-5: 2.90 Managed Acres	0.00	0.00	0.00	0.02	0.00	0.00
<i>Remnant Managed Acres East</i>	2.90	2.90	2.90	2.88	2.90	2.90
CRP-6: 3.67 Managed Acres	0.05	0.17	0.00	0.04	0.01	0.00
<i>Remnant Managed Acres East</i>	3.62	3.50	3.67	3.63	3.66	3.67
CRP-7: 0.80 Managed Acres	0.34	0.35	0.01	0.00	0.00	0.00
<i>Remnant Managed Acres West</i>	0.46	0.45	0.79	0.80	0.80	0.80
CRP-8: 17.00 Managed Acres	0.64	0.68	0.00	0.00	0.00	0.00
<i>Remnant Managed Acres West</i>	16.36	16.32	17.00	17.00	17.00	17.00
CRP-9: 30.32 Managed Acres	7.32	7.26	1.45	0.29	1.45	1.45
<i>Remnant Managed Acres West</i>	23.00	23.06	28.87	30.03	28.87	28.87
CFWP-10: 14.20 Managed Acres	0.00	0.00	0.00	0.00	0.00	0.00
<i>Remnant Managed Acres</i>	14.20	14.20	14.20	14.20	14.20	14.20
Public-11: 25,544.81 Managed Acres Morgan-Monroe State Forest	7.64	5.71	1.22	0.07	0.10	0.10
<i>Remnant Managed Acres East and West</i>	25,537.17	25,539.10	25,543.59	25,544.74	25,544.71	25,544.71



Table 5.22-1: Managed Lands Impacts by Alternatives

Managed Land Parcel Number	Alt 4	Alt 5	Alt 6	Alt 7	Alt 8	Refined Preferred Alt 8
CFWP-12: 105.20 Managed Acres	0.01	0.00	0.00	0.00	0.00	0.00
<i>Remnant Managed Acres West</i>	105.19	105.20	105.20	105.20	105.20	105.20
CFWP-13: 177.15 Managed Acres	0.67	0.00	0.00	0.00	0.00	0.00
<i>Remnant Managed Acres East</i>	176.48	177.15	177.15	177.15	177.15	177.15
CFWP-14: 11.19 Managed Acres	0	0	0	0	0	0.00
<i>Remnant Managed Acres East</i>	11.19	11.19	11.19	11.19	11.19	11.19
CFWP-15: 24.52 Managed Acres	6.22	6.27	2.30	2.24	2.29	2.29
<i>Remnant Managed Acres East</i>	18.30	18.25	22.22	22.28	22.23	22.23
CFWP-16: 0.65 Managed Acres	0.47	0.47	0.19	0.18	0.19	0.19
<i>Remnant Managed Acres East</i>	0.18*	0.18*	0.46*	0.47*	0.46*	0.46*
CFWP-17: 148.23 Managed Acres	0.00	0.99	0.00	0.00	0.00	0.00
<i>Remnant Managed Acres East</i>	148.23	147.24	148.23	148.23	148.23	148.23
CFWP-18: 41.26 Managed Acres	0	0	0	0	0	0.00
<i>Remnant Managed Acres East</i>	41.26	41.26	41.26	41.26	41.26	41.26
CFWP-19: 46.04 Managed Acres	0.85	0.65	0.35	0.37	0.33	1.03
<i>Remnant Managed Acres West</i>	45.19	45.39	45.69	45.67	45.71	45.01
CRP-20: 15.85 Managed Acres	0.60	0.00	0.00	0.00	0.00	0.00
<i>Remnant Managed Acres West</i>	15.25	15.85	15.85	15.85	15.85	15.85
Total Acres of Impact	26.32	26.09	6.13	6.49	5.48	8.29
* Parcel remnant is not large enough to remain enrolled in the CFWP.						

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Managed Land Property 1, [Public-1] (Figure 5.22-2) is the Mill Creek Easement. This easement is privately owned, but is publicly managed. It is 1.70 acres in size, and is accessed from Tapp Road east of SR 37 in Monroe County. All Section 5 alternatives would impact the property.

Alternatives 4, 5, 6, 7, 8 and Refined Preferred Alternative 8 would require acquisition of 0.69, 1.60, 0.61, 1.55, 1.11, or 1.50 managed acres for right-of-way, respectively. Approximately 1.01, 0.10, 1.09, 0.15, 0.59, or 0.20 managed acres, respectively, would remain east of the Interstate.

Managed Land Property 2, [Public-2] (Figure 5.22-2) is the Wapehani Mountain Bike Park on public land with 45.43 managed acres. This park is accessed from Weimer Road and Wapehani Road east of SR 37 in Monroe County. Alternatives 5, 7, and Refined Preferred Alternative 8 would impact the property.

Alternatives 5, 7, and Refined Preferred Alternative 8 would require acquisition of 1.10, 1.73, or 1.73 managed acres for right-of-way, respectively. Approximately 44.33, 43.70, or 43.70 managed acres, respectively, would remain east of the Interstate.

Managed Land Property 3, [Public-3] (Figure 5.22-3) is the Brown's Woods, which is privately owned but publicly maintained, with 11.01 managed acres. The property is accessed from Bloomfield Road and Basswood Drive east of SR 37 in Monroe County. Only Alternatives 4 and 5 would impact the property.

Alternatives 4 and 5 would require the acquisition of 0.82 or 0.84 managed acres for right-of-way, respectively. Approximately 10.19 or 10.17 managed acres, respectively, would remain east of the Interstate.

Managed Land Property 4, [Public-4] (Figure 5.22-3) is the Brown's Woods, which is privately owned but publicly maintained, with 5.61 managed acres. The property is accessed from Bloomfield Road and Basswood Drive east of SR 37 in Monroe County. No Section 5 alternatives would impact the property.

Managed Land Property 5, [CRP-5] (Figure 5.22-4) is enrolled in the CRP with 2.90 managed acres. This property is located east of SR 37 and north of Kinser Pike in Monroe County. Only Alternative 7 would impact the property.

Alternative 7 would require acquisition of 0.02 managed acres for right-of-way, leaving approximately 2.88 managed acres would remaining east of the Interstate.

Managed Land Property 6, [CRP-6] (Figure 5.22-4) is enrolled in the CRP with 3.67 managed acres. This property is located east of SR 37 and north of Kinser Pike in Monroe County. Alternatives 4, 5, 7, and 8 would impact the property.

Alternatives 4, 5, 7, and 8 would require acquisition of 0.05, 0.17, 0.04, or 0.01 managed acres for right-of-way, respectively. Approximately 3.62, 3.50, 3.63, or 3.66 managed acres, respectively, would remain east of the Interstate.



Managed Land Property 7, [CRP-7] (Figure 5.22-5) is enrolled in the CRP with 0.80 managed acres. This property is located west of SR 37 and north of Stonebelt Drive in Monroe County. Alternatives 4, 5, and 6 would impact the property.

Alternatives 4, 5, and 6 would require acquisition of 0.34, 0.35, or 0.01 managed acres for right-of-way, respectively. Approximately 0.46, 0.45, or 0.79 managed acres, respectively, would remain west of the Interstate.

Managed Land Property 8, [CRP-8] (Figure 5.22-5) is enrolled in the CRP with 17.00 managed acres. This property is located west of SR 37 and north of Stonebelt Drive in Monroe County. Only Alternatives 4 and 5 would impact the property.

Alternatives 4 and 5 would require acquisition of 0.64 or 0.68 managed acres for right-of-way, respectively. Approximately 16.36 or 16.32 managed acres, respectively, would remain west of the Interstate.

Managed Land Property 9, [CRP-9] (Figure 5.22-5) is enrolled in the CRP with 30.32 managed acres. This property is located west of SR 37 and north of Stonebelt Drive in Monroe County. All Section 5 alternatives would impact the property.

Alternatives 4, 5, 6, 7, 8, and Refined Preferred Alternative 8 would require acquisition of 7.32, 7.26, 1.45, 0.29, 1.45, or 1.45 managed acres for right-of-way, respectively. Approximately 23.00, 23.06, 28.87, 30.03, 28.87, or 28.87 managed acres, respectively, would remain west of the Interstate.

Managed Land Property 10, [CFWP-10] (Figure 5.22-6) is enrolled in the CFWP with 14.20 managed acres. This property is accessed from Duxberry Drive east of SR 37 in Monroe County. No Section 5 alternatives would impact the property.

Managed Land Property 11, [Public-11] (Figure 5.22-7 and Figure 5.22-8) is the Morgan-Monroe State Forest on public land with 25,544.81 managed acres. This property is located in both Monroe and Morgan counties at the county line. All Section 5 alternatives would impact the property.

Alternatives 4, 5, 6, 7, 8, and Refined Preferred Alternative 8 would require acquisition of 7.64, 5.71, 1.22, 0.07, 0.10, or 0.10 managed acres for right-of-way, respectively. Approximately 25,537.17, 25,539.10, 25,543.59, 25,544.74, 25,544.71, or 25,544.71 managed acres, respectively, would remain east and west of the Interstate.

Managed Land Property 12, [CFWP-12] (Figure 5.22-7) is enrolled in the CFWP with 105.20 managed acres. This property is accessible from Burma Road on the west side of SR 37 in Monroe County. Only Alternative 4 would impact the property.

Alternative 4 would require acquisition of 0.01 managed acres for right-of-way. Approximately 105.19 managed acres would remain west of the Interstate. The remaining managed land is greater than 10 acres in size and, is therefore eligible to remain in the CFWP.



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Managed Land Property 13, [CFWP-13] (Figure 5.22-8) is enrolled in the CFWP with 177.15 managed acres. This property is accessible from Pine Boulevard on the east side of SR 37 in Morgan County. Only Alternative 4 would impact the property.

Alternative 4 would require acquisition of 0.67 managed acre for right-of-way. Approximately 176.48 managed acres would remain east of the Interstate. The remaining managed land is greater than 10 acres in size, and is therefore eligible to remain in the CFWP.

Managed Land Property 14, [CFWP-14] (Figure 5.22-9) is enrolled in the CFWP with 11.19 managed acres. This property is located south of Liberty Church Road on the east side of SR 37 in Morgan County. No Section 5 alternatives would impact the property.

Managed Land Property 15, [CFWP-15] (Figure 5.22-9) is enrolled in the CFWP with 24.52 managed acres. This property is located south of Liberty Church Road on the east side of SR 37 in Morgan County. All Section 5 alternatives would impact the property.

Alternatives 4, 5, 6, 7, 8, and Refined Preferred Alternative 8 would require acquisition of 6.22, 6.27, 2.30, 2.24, 2.29, or 2.29 managed acres for right-of-way, respectively. Approximately 18.30, 18.25, 22.22, 22.28, 22.23, or 22.23 managed acres, respectively, would remain east of the Interstate. The remaining managed land is greater than 10 acres in size, and is therefore eligible to remain in the CFWP.

Managed Land Property 16, [CFWP-16] (Figure 5.22-9) is enrolled in the CFWP with 0.65 managed acres, which is below the 10-acre requirement for CFWP properties. This property is located south of Liberty Church Road on the east side of SR 37 in Morgan County. All Section 5 alternatives would impact the property.

Alternatives 4, 5, 6, 7, 8, and Refined Preferred Alternative 8 would require acquisition of 0.47, 0.47, 0.19, 0.18, 0.19, or 0.19 managed acres for right-of-way, respectively. Approximately 0.18, 0.18, 0.46, 0.47, 0.46, or 0.46 managed acres, respectively, would remain east of the Interstate. The remaining managed land is less than 10 acres in size and, therefore, is no longer eligible to remain in the CFWP. However, the existing property is also less than 10 acres in size.

Managed Land Property 17, [CFWP-17] (Figure 5.22-8 and Figure 5.22-9) is enrolled in the CFWP with 148.23 managed acres. This property is located south of Liberty Church Road on the east side of SR 37 in Morgan County. Only Alternative 5 would impact the property.

Alternative 5 would require acquisition of 0.99 managed acres for right-of-way. Approximately 147.24 managed acres would remain east of the Interstate. The remaining managed land is greater than 10 acres in size and is therefore eligible to remain in the CFWP.

Managed Land Property 18, [CFWP-18] (Figure 5.22-9) is enrolled in the CFWP with 41.26 managed acres. This property is located south of Liberty Church Road on the east side of SR 37 in Morgan County. No Section 5 alternatives would impact the property.



Managed Land Property 19, [CFWP-19] (Figure 5.22-1) is enrolled in the CFWP with 46.04 managed acres. This property is accessible from That Road west of SR 37 in Monroe County. All Section 5 alternatives would impact the property.

Alternatives 4, 5, 6, 7, 8, and Refined Preferred Alternative 8 would require acquisition of 0.85, 0.65, 0.35, 0.37, 0.33, or 1.03 managed acres for right-of-way, respectively. Approximately 45.19, 45.39, 45.69, 45.67, 45.71, or 45.01 managed acres, respectively, would remain west of the Interstate. The remaining managed land is greater than 10 acres in size and is therefore eligible to remain in the CFWP.

Managed Land Property 20, [CRP-20] (Figure 5.22-4) is enrolled in the CRP with 15.85 managed acres. This property is located north of Bell Road west of SR 37 in Monroe County. Only Alternative 4 would impact the property.

Alternative 4 would require acquisition of 0.60 managed acres for right-of-way. Approximately 15.25 managed acres would remain west of the Interstate.

5.22.4 Mitigation

For purposes of this study, managed lands include all of the following: all outdoor recreational facilities; all publicly managed lands; and, all private properties whose owners participate in federal, state, and local wetland, habitat, or other conservation and management programs. There are federal and state interests in many of the privately-owned managed lands in the form of cost-sharing agreements, purchased easements, or property tax reductions. Federal and state funds have been or are being expended on many of these properties. There are 15 privately owned managed land properties located throughout the Section 5 corridor. Nine participate in the IDNR CFWP. Six are enrolled in the USDA-NRCS CRP.

The CFWP and CRP programs described above do not involve relinquishment of ownership of the property through dedication of a permanent conservation easement or other method of terminating property rights. The properties are privately owned and are not officially designated as a public park, recreational area, or wildlife or waterfowl refuge; therefore, they do not qualify for protection under Section 4(f) of the Department of Transportation Act of 1966, 49 U.S.C. §303(c) (see **Chapter 8, Section 4(f)**, for further discussion). With the exception of any wetland and forest areas within the managed properties, mitigation for impacts to the managed land areas could be accomplished through repayment to the resource agencies of amount associated with each cost-sharing agreement and abiding by other agreement stipulations. These mitigation measures would apply only if the agreements are still in force (i.e., the time stipulated periods have not expired). Mitigation for impacts to wetlands is described in **Section 5.19.2, Surface Waters**, and in **Chapter 7, Mitigation and Commitments**. Mitigation for impacts to forests is described in **Section 5.20.4, Mitigation (Forests)**, and in **Chapter 7, Mitigation and Commitments**.

Wapehani Mountain Bike Park is a publicly owned park that qualifies for protection under Section 4(f) of the Department of Transportation Act of 1966, 49 U.S.C. §303(c). Please see **Chapter 8, Section 4(f)**, for additional discussion of this resource. As outlined in the Wapehani

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MOA (**Appendix QQ**), the land required for right-of-way will be purchased in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646), as amended in 1987 (Uniform Act). In addition, the City will be compensated to reconnect the portion of the trail impacted by the project in a manner that provides a similar challenge for the user and provides other aesthetic improvements identified by the City on property owned by the City within the Wapehani Mountain Bike Park. Coordination with the City will continue during final design.

Section 4(f) does not apply to the portion of the Morgan-Monroe State Forest within the Section 5 corridor, the Mill Creek Conservation Easement, or Brown's Woods (see 23 CFR § 774.11(d)). The portions of the Section 5 corridor that abut the Morgan-Monroe State Forest are managed primarily for timber and wildlife harvesting and are not used for recreational or refuge activities. The Mill Creek Conservation Easement is not under public ownership and the purpose of the easement does not provide for public use. Brown's Woods is not under public ownership and while public access is allowed, the property is maintained by the City of Bloomington as a natural woodland.

While Section 4(f) does not apply, I-69 provides visitors access to the Morgan-Monroe State Forest; therefore, the following design features are committed to as part of the Refined Preferred Alternative:

- A local access road that connects the Sample Road Interchange with Chambers Pike will provide visitor access from the south.
- The overpass at Chambers Pike will provide access to forest property on the west side of SR 37/I-69.
- A local access road that connects Liberty Church Interchange with Old 37 will provide visitor access from the north.
- Directional signage will be provided from Liberty Church and Sample Road Interchanges to direct visitors.
- A local access road will be provided between Burma Road and Chambers Pike to maintain access to forest property on both sides of SR 37/I-69.

5.22.5 Summary

A total of 20 managed lands were identified. Of this total, 15 are privately-owned managed land properties and five are publicly owned or managed. Nine of the privately-owned managed land properties participate in the IDNR CFWP, while six are enrolled in the USDA-NRCS CRP. Wapehani Mountain Bike Park is a publicly owned park that qualifies for protection under Section 4(f). **Chapter 8, Section 4(f)**, provides additional context on parks and Section 4(f) coordination.



Four managed land properties (Public-4 [Brown's Woods], CFWP-10, CFWP-14, and CFWP-18) were avoided by all Section 5 alternatives. Depending on the alternative, right-of-way acquisition may be necessary from the remaining 16 managed land properties.

Table 5.22-1 summarizes impacts to managed land properties in the Section 5 corridor. The table identifies the total right-of-way acquisition from each managed land property, the amount of managed acres that remain, and CFWP properties with remnants that are under 10 acres in size and not eligible to remain in the program.

Alternatives 4 and 5 would impact three to five times the total acreage of managed lands when compared to Alternatives 6, 7, 8, and Refined Preferred Alternative 8. Alternative 8 would have the lowest total impacts to managed lands. Alternatives 6, 7, 8, and Refined Preferred Alternative 8 have substantially lower impacts to the Morgan-Monroe State Forest (Public-11), CRP-9, and CFWP-15 when compared with the other alternatives. Most of the differences between alternatives are at these three managed land properties.



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**Section 5.22 Figure Index**

(Figures follow this index.)

Figure Reference	Number of Sheets
Figure 5.22-1: Section 5 Alternatives and Managed Lands, showing CFWP-19	1
Figure 5.22-2: Section 5 Alternatives and Managed Lands, showing Public-1 and Public-2	1
Figure 5.22-3: Section 5 Alternatives and Managed Lands, showing Public-3 and Public-4	1
Figure 5.22-4: Section 5 Alternatives and Managed Lands, showing CRP-5, CRP-6, and CRP-20	1
Figure 5.22-5: Section 5 Alternatives and Managed Lands, showing CRP-7, CRP-8, and CRP-9	1
Figure 5.22-6: Section 5 Alternatives and Managed Lands, showing CFWP-10	1
Figure 5.22-7: Section 5 Alternatives and Managed Lands, showing Public-11 and CFWP-12	1
Figure 5.22-8: Section 5 Alternatives and Managed Lands, showing CFWP-13, CFWP-17, and Public-11	1
Figure 5.22-9: Section 5 Alternatives and Managed Lands, showing CFWP-14, CFWP-15, CFWP-16, CFWP-17, and CFWP-18	1

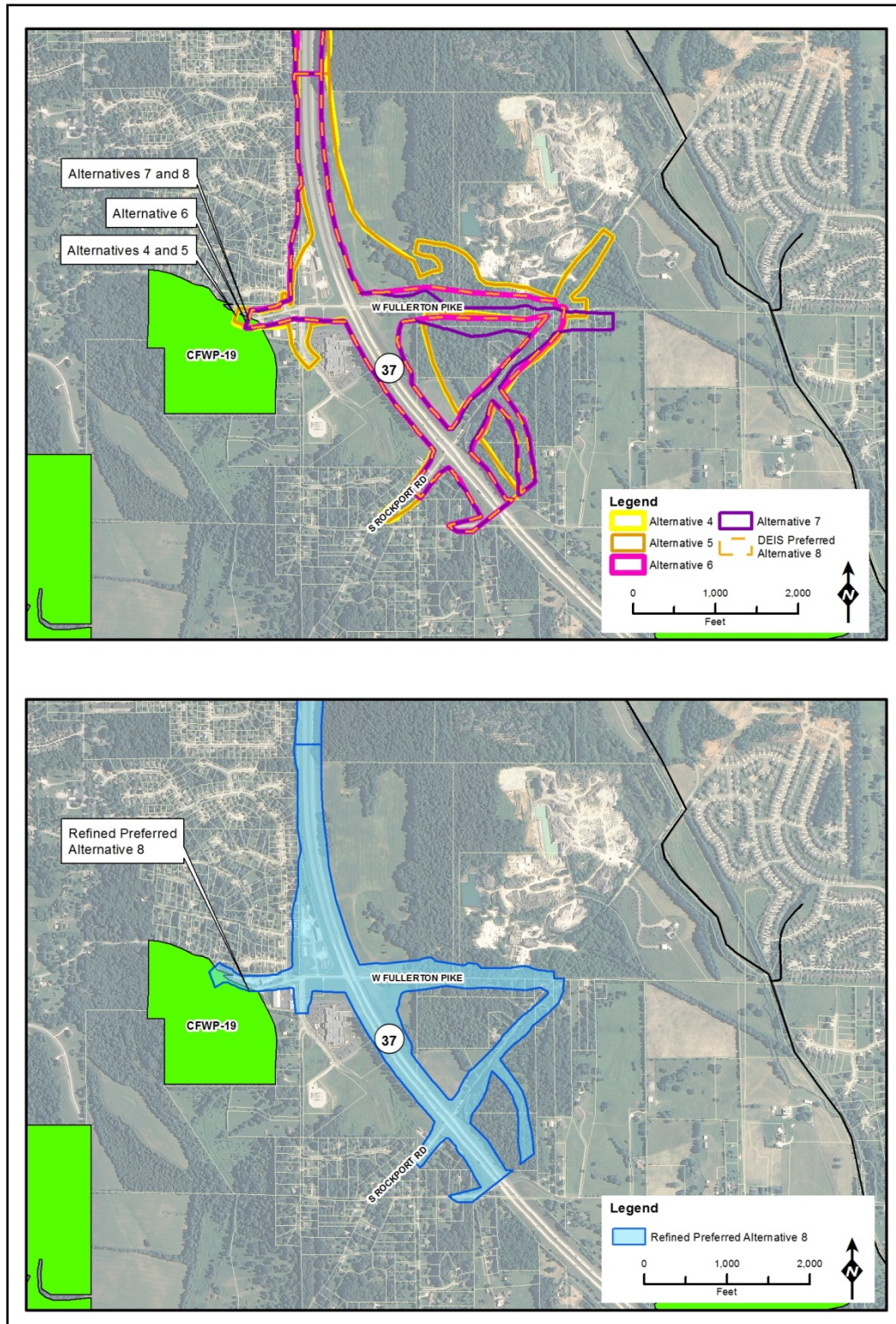


Figure 5.22-1: Section 5 Alternatives and Managed Lands, showing CFWP-19

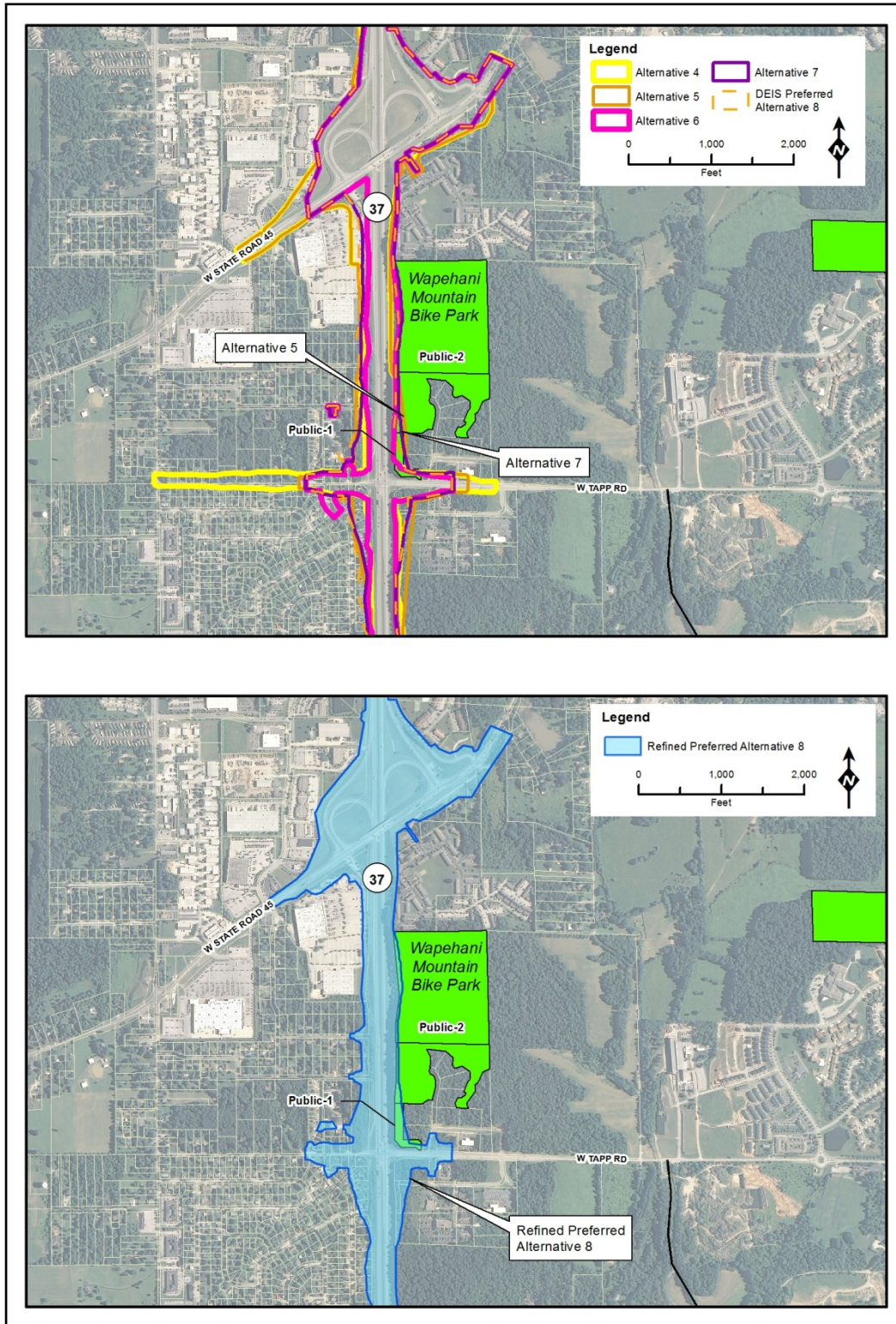


Figure 5.22-2: Section 5 Alternatives and Managed Lands, showing Public-1 and Public-2

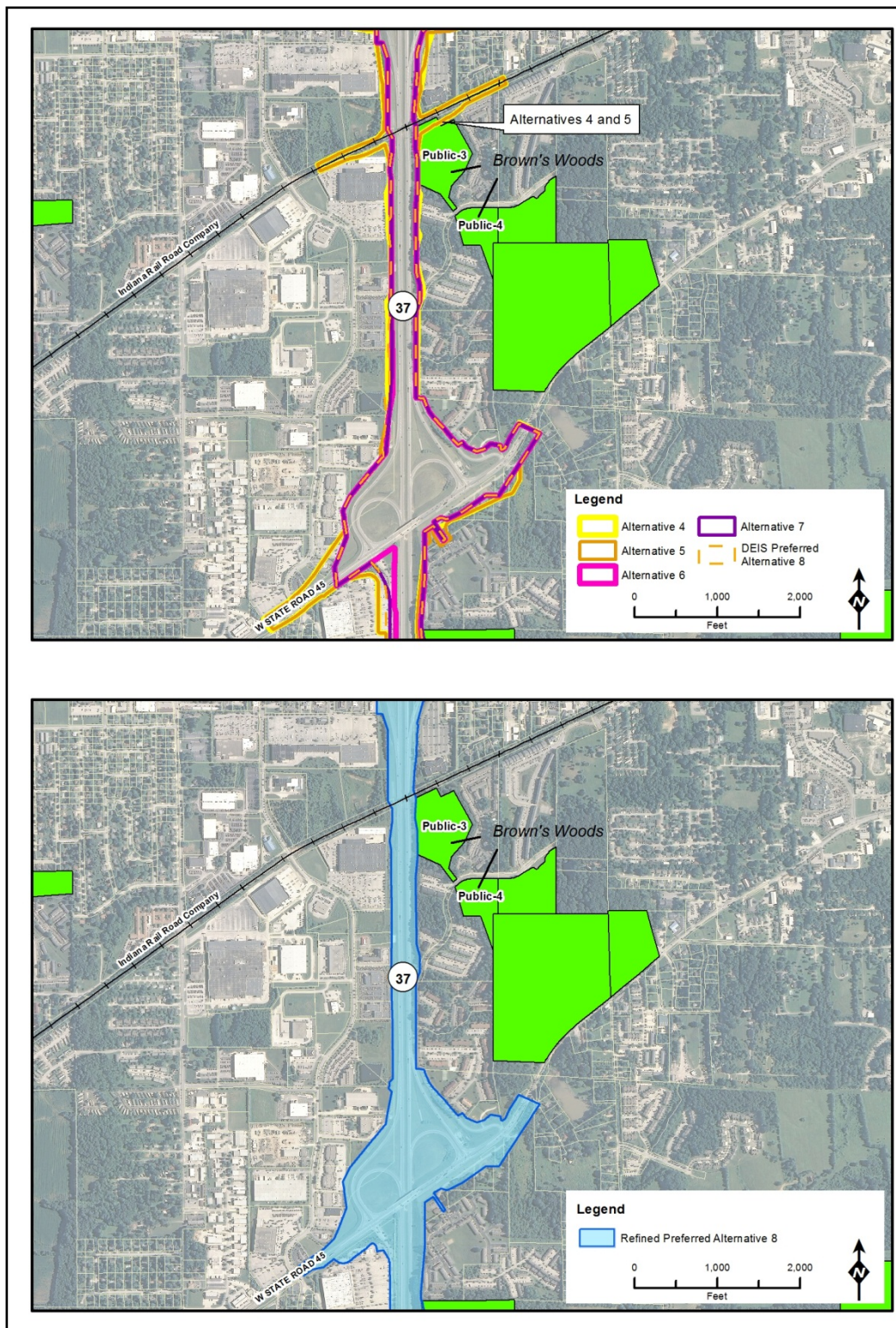


Figure 5.22-3: Section 5 Alternatives and Managed Lands, showing Public-3 and Public-4

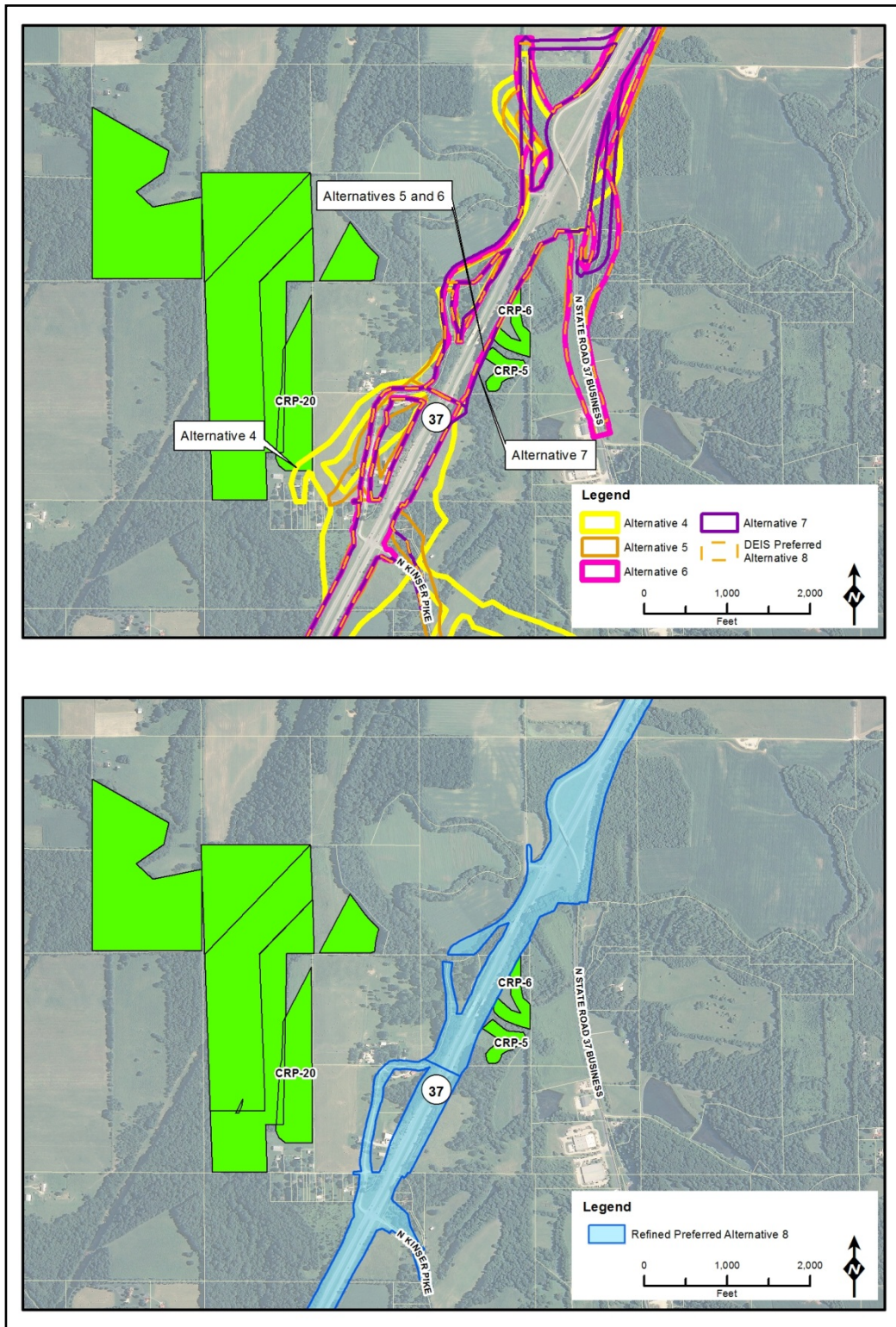


Figure 5.22-4: Section 5 Alternatives and Managed Lands, showing CRP-5, CRP-6, and CRP-20

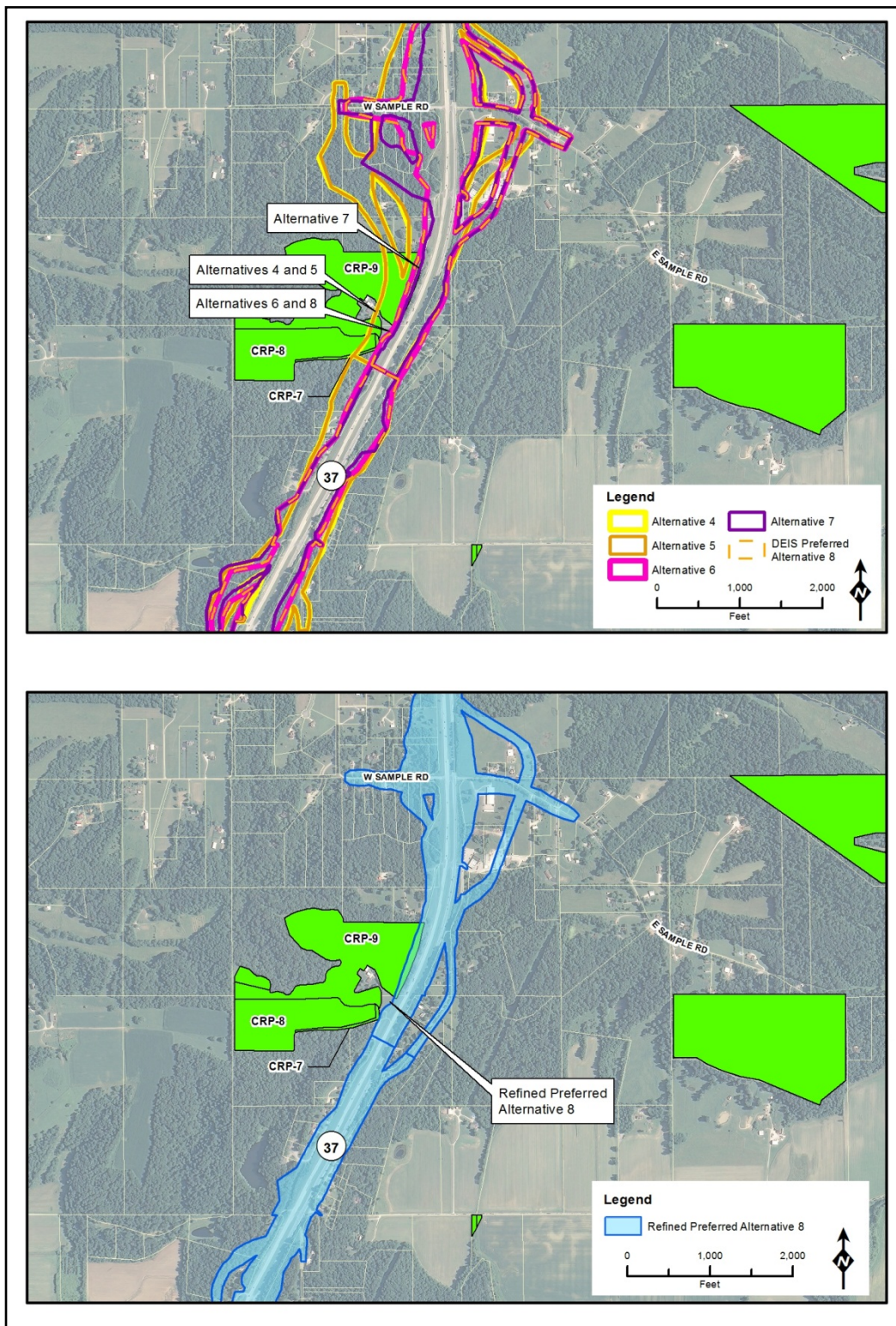


Figure 5.22-5: Section 5 Alternatives and Managed Lands, showing CRP-7, CRP-8, and CRP-9

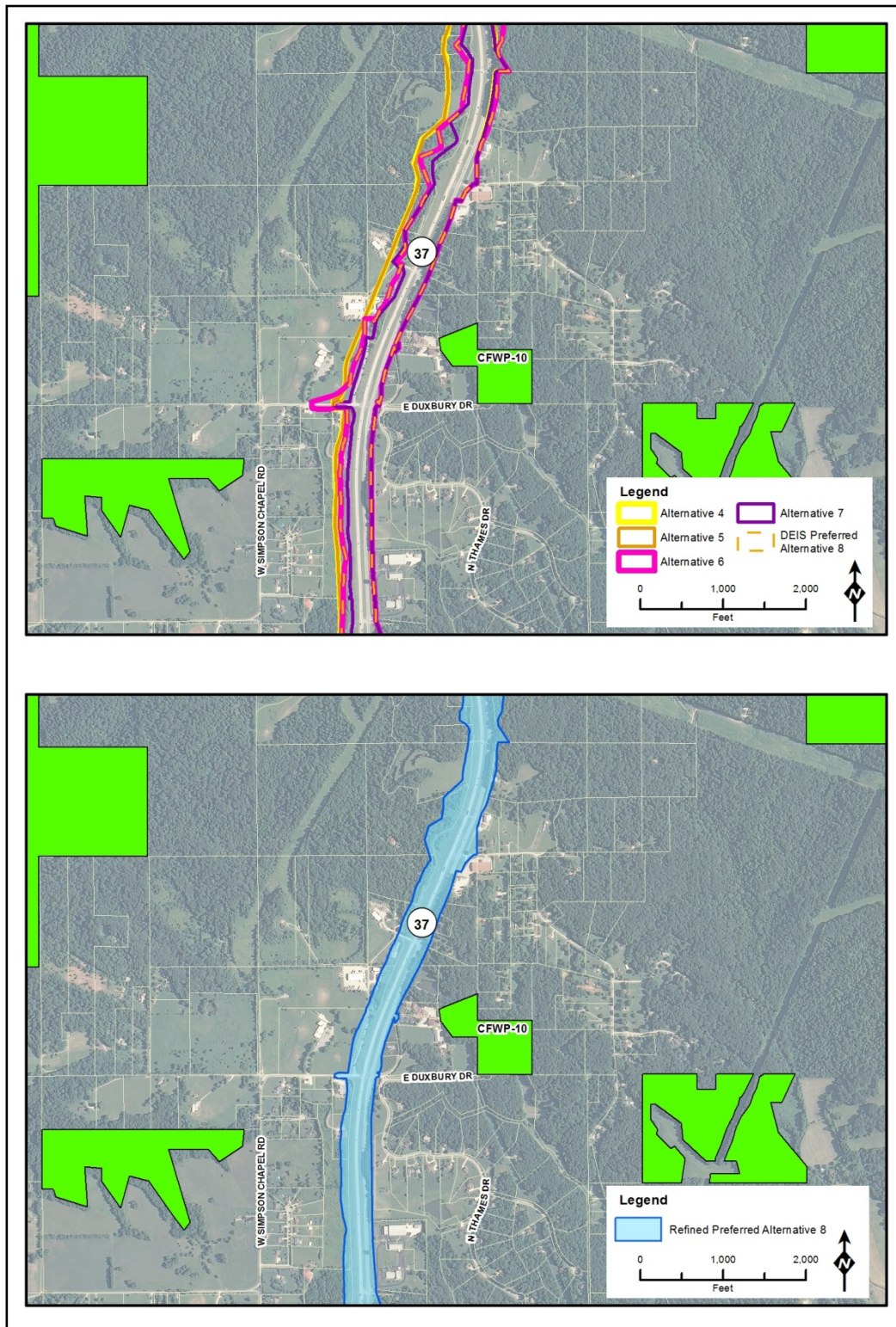


Figure 5.22-6: Section 5 Alternatives and Managed Lands, showing CFWP-10

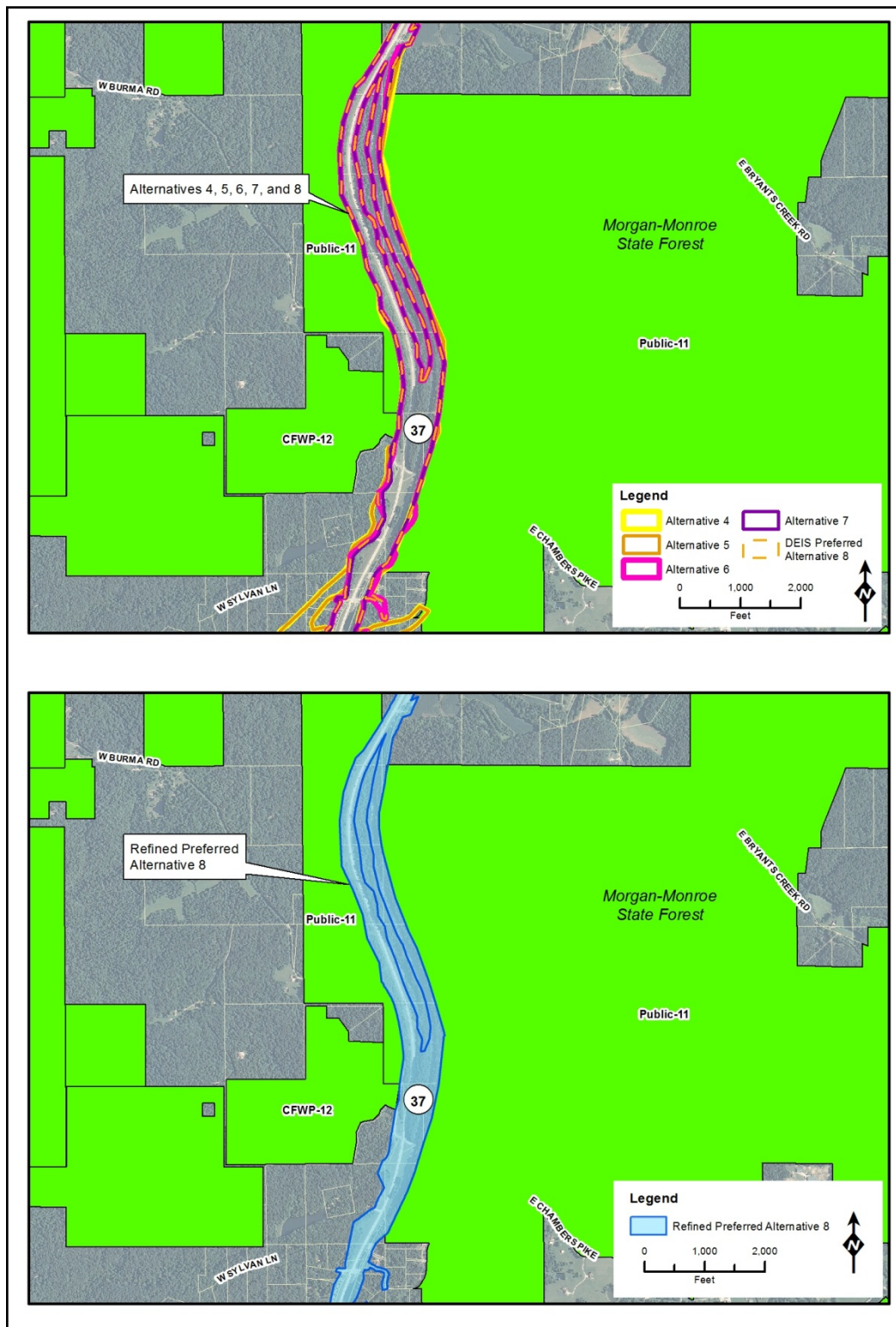


Figure 5.22-7: Section 5 Alternatives and Managed Lands, showing Public-11 and CFWP-12

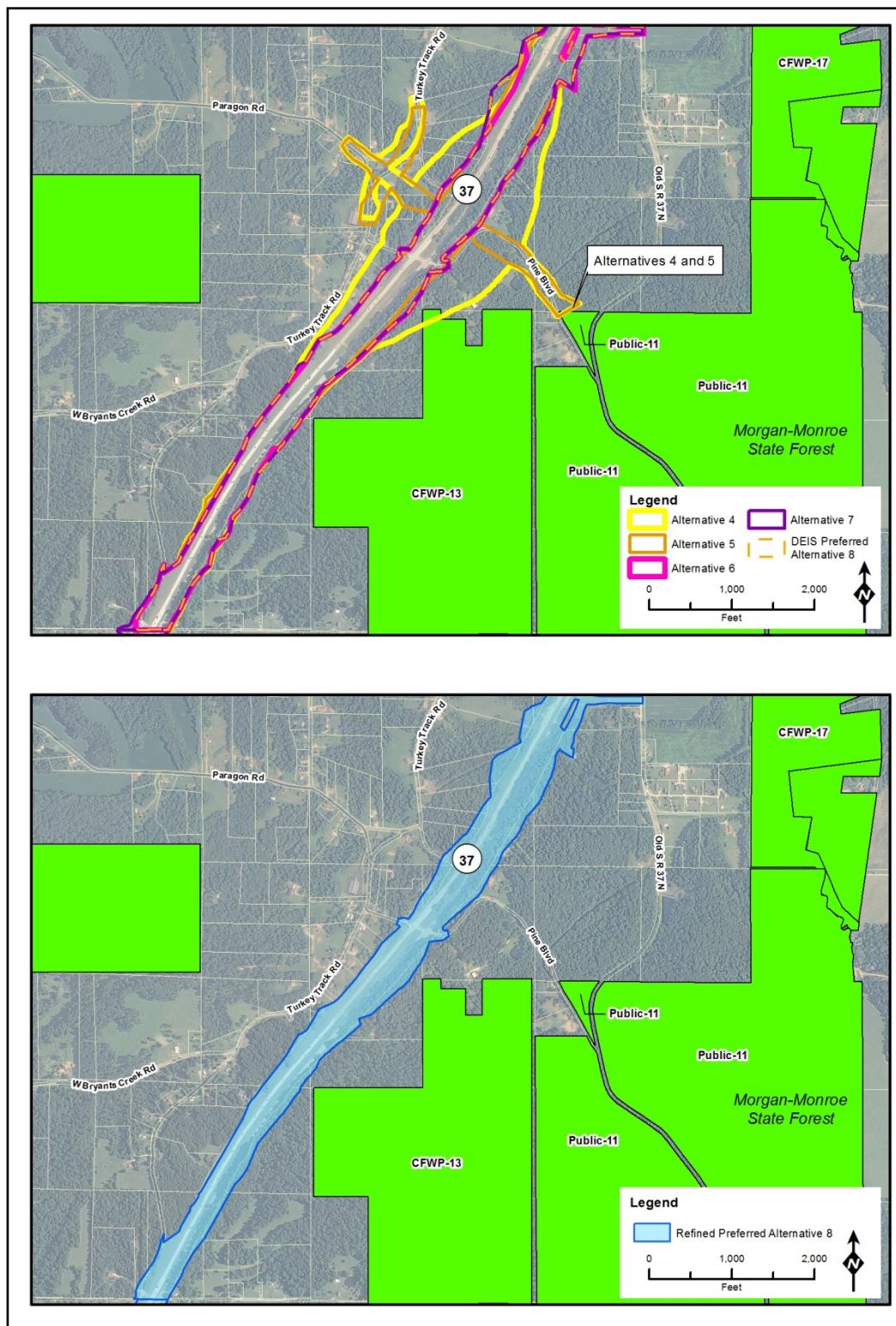


Figure 5.22-8: Section 5 Alternatives and Managed Lands, showing CFWP-13, CFWP-17, and Public-11

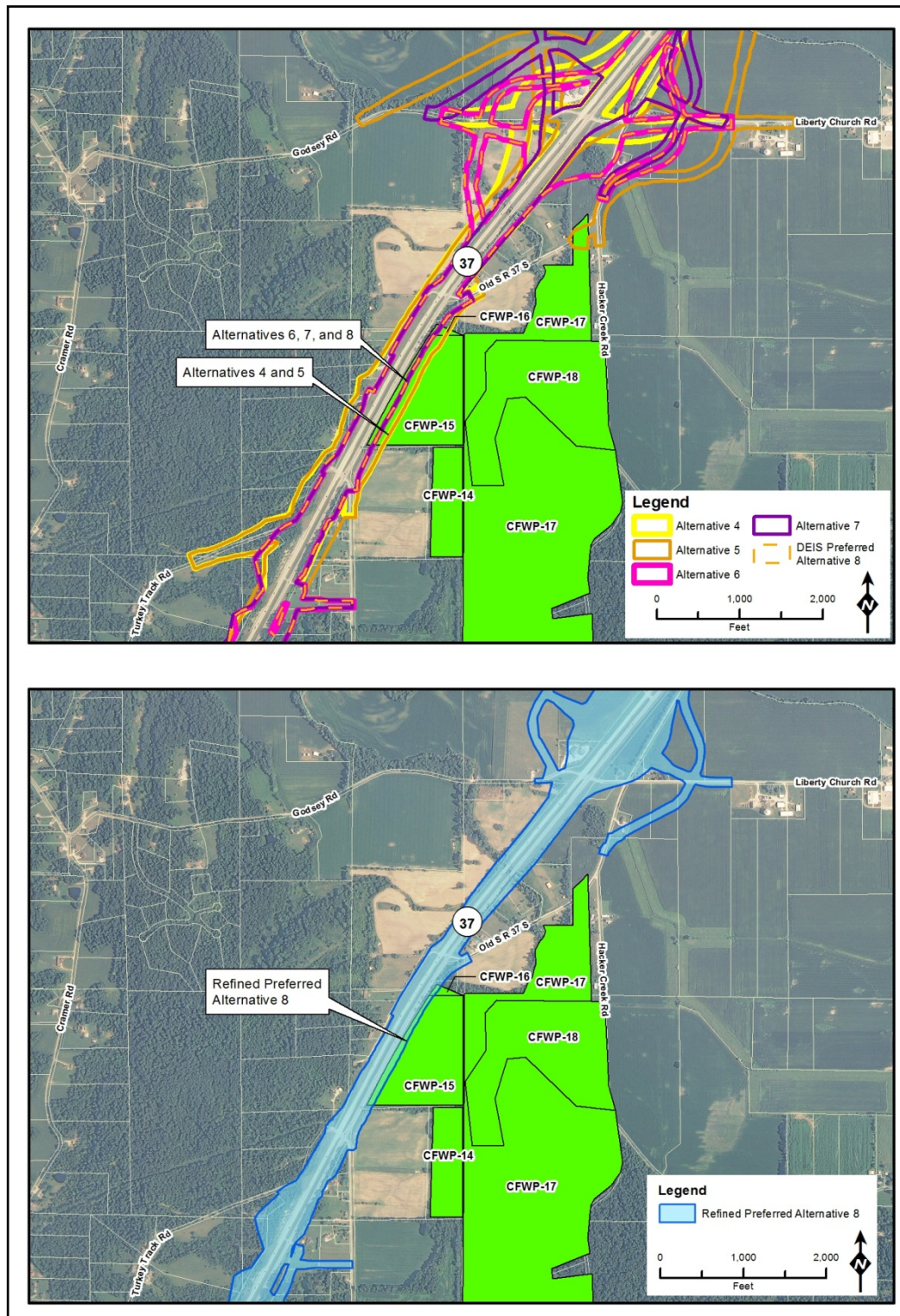


Figure 5.22-9: Section 5 Alternatives and Managed Lands, showing CFWP-14, CFWP-15, CFWP-16, CFWP-17, and CFWP-18



5.23 Permits

No substantive changes have been made to this section since the publication of the Draft Environmental Impact Statement (DEIS).

5.23.1 Introduction

Each of the end-to-end alternatives would require permit issuance prior to beginning construction within applicable permit areas. Permits that may be required include: United States Army Corps of Engineers' (USACE) Section 404 Permit; Section 401 Water Quality Certification (WQC) and an isolated wetland permit from Indiana Department of Environmental Management (IDEM); Construction in a Floodway Permit from Indiana Department of Natural Resources (IDNR); and Class V Injection Well Permit from the United States Environmental Protection Agency (USEPA). Satisfaction of IDEM's National Pollutant Discharge Elimination System (NPDES) Rule 5 requirements found in 327 IAC 15-5, will also be needed.

The Section 404 Permit, Section 401 WQC and NPDES permits are authorized under the federal Clean Water Act (CWA), and the decisions are subject to the State of Indiana's water quality standards under Indiana Administrative Code (IAC) Title 327 of the Water Pollution Control Board (WPCB). IDEM regulates wetlands that do not fall under USACE jurisdiction. Isolated Wetland Permits are required under Indiana's Isolated Wetlands Law (IC 13-18-22) and the rule implementing the law (327 IAC 17). IDNR will require permit approvals for floodway impacts under the State of Indiana's Flood Control Act IC 14-28-1. Rule 5 (327 IAC 15-5) requirements regulates contaminant discharge via stormwater runoff from construction sites. In addition to Rule 5 requirements, other NPDES stormwater permit requirements may apply to this project.

All necessary permits will be applied for and obtained prior to the construction of this project, and the terms and conditions of these permits will be adhered to during the construction and maintenance of this facility. Contractors will be required to obtain the necessary permits that are related to their construction practices such as for construction of temporary roads and causeways for bridge construction or waste and borrow pits, if necessary.

An overall I-69 permitting and mitigation tracking method has been developed in consultation with permitting agencies and USEPA. The tracking will be accomplished within a Geographic Information System (GIS) database with GIS linked map information. The Indiana Department of Transportation (INDOT) will provide to permitting agencies and USEPA a tracking summary on an annual basis as a part of mitigation monitoring reports. The summary will identify the permitting and mitigation commitments and describe the status of the activities-to-date associated with each commitment.

5.23.2 Section 404 Permit

Projects involving excavation and/or discharges of dredged or fill material into waters of the United States, including jurisdictional wetlands, and not authorized under either a general or a nationwide permit, require an Individual USACE Section 404 Permit or a letter of permission



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from the USACE prior to the commencement of construction. Section 404 Permits will be applied for before or during the design phase of the project. **Figure 5.23-1** (figures are located at the end of the chapter) shows an example of a wetland subject to these regulations. The type of Section 404 Permit anticipated for this project is called an Individual Permit (IP), which covers impacts to wetlands and streams (area below the Ordinary High Water Mark [OHWM]) that are more than one acre in size or 1,500 linear feet of stream. The IP is used for larger and more significant impacts to waters of the United States, and in general is much more involved and takes longer to secure.

The Individual Section 404 Permit process will be initiated by the formal submittal requesting a jurisdictional determination from the USACE for the potentially impacted water resources associated with the project. Following the jurisdiction determination response from the USACE, the applicant would prepare and submit an application documenting all anticipated water resources impacts of the project and any needed compensatory mitigation proposal. Upon confirmation that the application material is complete, the USACE will publish a public notice of the project for a 30-day comment period. Following the comment period, the USACE will prepare their decision document for the project, which will include addressing National Environmental Policy Act (NEPA) requirements, and evaluating the project based on Section 404 requirements. If the USACE determines that those requirements have been met and all appropriate documentation has been provided, they will provide an authorization letter notifying the applicant that the project has been approved for construction, typically with some conditions.

The *Final Stream Assessment Report* prepared for Section 5 (see **Section 5.19, Water Resources**, and **Appendix M, Final Stream Assessment Report**) identified 477 stream segments in the project corridor that may be considered “waters of the U.S.,” and therefore would be under USACE jurisdiction. The potential stream impacts within the right-of-way would be least under Refined Preferred Alternative 8 (80,582 linear feet) and the greatest with Alternative 4 (106,445 linear feet). None of the alternatives cross every stream in the corridor; however, in some instances a single alternative may have more than one crossing of a single stream.

The *Final Wetland Technical Report* prepared for Section 5 (see **Section 5.19, Water Resources**, and **Appendix F, Final Wetland Technical Report**) identified 33 wetland complexes and 10 open water features that would be within the construction limits of at least one alternative. The total number of wetland complexes and open water features impacted by the alternatives range from 22 (Refined Preferred Alternative 8) to 35 (Alternative 5). The total area of wetland and open water impacts range from approximately 3.45 acres to 20.24 acres (Refined Preferred Alternative 8 and Alternative 5, respectively). The majority of the impacts are to palustrine emergent wetlands (PEM).

5.23.3 Section 401 Water Quality Certification

The Section 401 WQC is a state’s review of applications for Section 404 USACE’s permits for compliance with state water quality standards. Any activity involving dredging, excavation, or filling within waters of the United States requires a Section 401 WQC from IDEM. Section 401 WQC will be applied for before or during the design phase of the I-69 project.



While the USACE 404 Permit addresses broad, national waterway issues, the IDEM review focuses on how the project may impact the water quality of state waters, as applied under the CWA within the jurisdiction of Indiana’s water quality standards under IAC Title 327. The IDEM review of water quality impacts, while focusing primarily on wetland and stream impacts, must include a review of the physical, biological, and chemical impacts on water quality. While USEPA has reviewed and approved Indiana’s water quality standards, USEPA has no oversight of Section 401 WQCs for states. The certifications are undertaken by states to ensure that the federal permit does not adversely impact state water quality.

5.23.4 Isolated Wetlands

Under the Indiana Isolated Wetlands Regulatory Program, IDEM regulates wetlands that do not fall under USACE jurisdiction (Isolated Wetlands). Isolated wetlands are those wetlands that are not considered connected or adjacent to “waters of the U.S.” Isolated wetlands are grouped into one of three classes based upon wetland quality. Class III isolated wetlands are generally of higher quality; Class I wetlands are of lower quality; and Class II wetlands fall somewhere in the middle. Different wetland classes require different mitigation requirements.

Official determination of regulatory status of wetlands as “waters of the U.S.” or “isolated” must be made by the USACE in a formal Jurisdiction Determination. USEPA will review and has the authority to make the final decision on the federal jurisdictional determinations as part of its responsibility in jointly administering Section 404 of the CWA. The authority of IDEM to regulate activities in isolated wetlands is granted by Indiana Code 13-18-22. Filling and grading work and the sidelaying of excavated material into isolated wetlands constitutes or otherwise involves discharges of dredged and/or fill material that fall under the regulatory authority of IDEM.

All of the alternatives would impact one wetland that is considered isolated based on preliminary review. The application for the IDEM Isolated Wetland Permit would be made together with the application for IDEM’s Section 401 WQC, if required.

5.23.5 Construction within a Floodway Permit

Indiana’s Flood Control Act (IC 14-28-1) requires that any person proposing to construct a structure, place fill, or excavate material at a site located within the floodway of any river or stream, unless that activity is exempted, must obtain the written approval of IDNR prior to initiating the activity. This law was originally enacted to protect Indiana citizens from the loss of lives and property caused by floods, and it ensures that floodway channels are not inhabited and kept free and clear of interference or obstruction that will result in undue restriction to the capacity of the floodway. Since its enactment, the scope of IDNR’s analysis has been expanded to protect Indiana’s natural resources located in the floodway. If needed, a construction in a Floodway Permit(s) would be applied for before or during the design phase of this project.



5.23.6 National Pollution Discharge Elimination System Permit

Water pollution degrades surface waters making them unsafe for drinking, fishing, swimming, and other activities. Since its introduction in 1972, the NPDES Permit program is responsible for significant improvements to our nation's water quality. As authorized by the CWA, the NPDES permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches. Industrial, municipal, and other facilities, which maintain discrete separate stormwater discharges directly to surface waters, must obtain NPDES Permits under 327 IAC 15-13 (Rule 13). INDOT, similarly, is required to permit discrete separate stormwater discharges under 327 IAC 5-4-6. While the INDOT permit and requirements have not yet been finalized by IDEM, it is anticipated that this project will include some requirements under this NPDES Permit.

5.23.7 Rule 5 – Erosion Control

Rule 5 is a state regulation (327 IAC 15-5) to control erosion resulting from construction activity. The purpose of Rule 5 is to reduce pollutants, principally sediment as a result of soil erosion, in stormwater discharges into surface waters. The requirements of Rule 5 apply to all persons who are involved in construction activity that results in the disturbance of one acre or more of total land area. Rule 5 requires that a construction plan be developed, and as part of the overall construction plan, an erosion and sediment control plan and storm water pollution prevention plan (SWPPP) is developed. As part of the erosion and sediment control plan and SWPPP, best management practices (BMPs) will be used such as burlap, jute matting, grading, seeding, and sodding, to minimize sediment and debris from leaving the project site in stormwater runoff and minimize sediment and debris in tributaries crossed by the project. The overall construction plan would be approved by INDOT and IDEM prior to construction.

The applicant must submit the construction plan and a Notice of Intent to IDEM for review and to obtain a Notice of Sufficiency. The notice must state the project start date, which is then used by IDEM to determine the five-year duration date of the notice. Plan implementation must occur before, during, and after construction. Upon completion of construction, a Notice of Termination must be submitted to IDEM.

Figure 5.23-2 illustrates the type of erosion that can occur in the course of a construction project.

5.23.8 Class V Injection Well Permit

USEPA Class V injection well permits may be required for various types of projects. Most of the Class V well permits anticipated within Section 5 would be authorized by rule because there will be measures in place as part of sinkhole mitigation under the Karst MOU. While the specific karst features requiring a Class V injection well are not known at the EIS stage of the Section 5 project, they are likely to be related to sinkholes if they are modified to receive Section 5 stormwater drainage as part of final design. For example, such a permit could be required by USEPA Region 5 if a Class V injection well is located within the karst region of the state; a sole source aquifer area; a state designated source water protection area for a public water supply; or,



anywhere untreated fluids discharged through a Class V well may otherwise endanger an underground source of drinking water. If there are measures in place to prevent contamination of groundwater, a Class V well could be authorized by rule rather than by a permit. A Class V Well Inventory Form would need to be provided to USEPA Region 5 prior to construction of a Class V injection well so that USEPA could determine if a Class V injection well permit will be required for any Class V wells. For the I-69 project, if the inventory information provided indicates that any injection well would likely contaminate any underground source of drinking water, a permit would be required. Any permits would need to be applied for and obtained prior to construction of the Class V well.

5.23.9 Tall-Structure Permit

A Tall-Structure permit is required where proposed construction may impact the navigable airspace of a public-use airport. Proposed construction may include permanent installation (e.g., high-mast lighting towers) or construction equipment (e.g., crane, derrick). Monroe County Airport is a public-use airport within 20,000 feet of existing SR 37 and the Section 5 alternatives. Coordination with INDOT's Office of Aviation and the Federal Aviation Administration will be required during the final design phase to determine whether Tall-Structure permits are necessary.



Section 5.23 Figure Index

(Figures follow this index.)

Figure Reference	Number of Sheets
Figure 5.23-1: Typical Wetland Subject to Regulation	(p. 5.23-7)
Figure 5.23-2: Typical Construction Site Erosion	(p. 5.23-7)



**Figure 5.23-1: Typical Wetland
Subject to Regulation**



**Figure 5.23-2: Typical Construction
Site Erosion**



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5.24 Indirect and Cumulative Impacts

For purposes of this section, Preferred Alternative 8 that was identified in the Draft Environmental Impact Statement (DEIS) will be referred to as “Alternative 8.” The Preferred Alternative for the Final Environmental Impact Statement (FEIS) will be referred to as the “Refined Preferred Alternative 8.”

Since the publishing of the DEIS, the following substantive changes have been made to this section:

- Added Refined Preferred Alternative 8 direct, indirect, and cumulative impacts to agricultural lands, upland forests, wetlands, streams, and karst.
- The direct wetland and stream impacts were updated in **Section 5.24.3 – 9. Determine the magnitude of significance of cumulative effects by identifying the changes in Section 5 as a result of I-69** and in **Tables 5.24-7A-F**.
- Added details of City of Martinsville TIF and annexation plans to **Section 5.24.3 – 4. Identify other actions affecting the resources, ecosystems, and human communities of concern**.

5.24.1 Introduction

The cumulative effects are the sum of the project’s direct and indirect impacts added to those of the past, present, and reasonably foreseeable future actions of others. The basis for this project’s indirect effects analysis is the anticipated change in land use that the project alternatives are predicted to cause in Monroe and Morgan counties. The cumulative impacts analysis will be analyzed in this same project area.

The project will cause indirect and cumulative impacts. For example, new businesses and industries stimulated by improved access create job opportunities that attract employees into an area. The job growth would spur residential development, which in turn impacts schools and community support services, and creates a demand for additional businesses, thereby increasing the potential for more development. Indirectly, the project could influence the location of new developments and affect the expected rate of growth. A typical scenario is the conversion of farmland or undeveloped land to residential, commercial, or a mix of uses, particularly near proposed interchanges. Agricultural land converted for induced development is added to the agricultural land taken for right-of-way to recognize the cumulative total effect of the project. In addition, the new highway-induced development would spur more road improvements or new roads, which would, in turn, result in additional use of currently undeveloped land for development.

Council on Environmental Quality (CEQ) regulations define direct impacts as “effects which are caused by the action and occur at the same time and place.” An example of a direct impact for I-69 Section 5 would be the use of a particular piece of property for right-of-way for a project alternative.

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CEQ defines indirect impacts as “effects which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.” An example of an indirect impact for I-69 Section 5 would be the change in the use of a particular piece of property as a result of a project alternative. These changes in land use are anticipated to occur in areas that are currently undeveloped and have not been identified as part of a proposed development, but are reasonably foreseeable as a result of the proposed action.

Cumulative effects include “other” past, present, and reasonably foreseeable future actions in addition to the proposed I-69 project within the project area, regardless of what agency (federal or non-federal) or person undertakes such actions (40 CFR 1580.7). Cumulative effects are the environmental impacts resulting from both the I-69 project (including both direct and indirect impacts) and from other past, present, and reasonably foreseeable future actions.

5.24.2 Methodology

The methods detailed in the following resources were used in determining the cumulative impacts in both the Tier 1 and Tier 2 Environmental Impact Statements (EIS):

- “Interim Guidance: Questions and Answers Regarding the Consideration of Indirect and Cumulative Impacts in the NEPA Process” (Federal Highway Administration (FHWA), 2003)
- “Indirect and Cumulative Impact Assessment in the Highway Project Development Process” (FHWA Position Paper, HEP-32, 1992)
- “Considering Cumulative Effects Under the National Environmental Policy Act” (CEQ, 1997)
- “Guidance for Estimating the Indirect Effects of Proposed Transportation Projects” (National Cooperative Highway Research Program Report (NCHRP) Report 403, 1998)
- “Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects” (NCHRP Report 466, 2002)
- “Consideration of Cumulative Impacts in EPA Review of NEPA Documents” (United States Environmental Protection Agency (USEPA) 315-R-99-002, 1999)
- “The National Environmental Policy Act – Conducting Quality Cumulative Effects Analyses” (materials from workshop conducted by Environmental Planning Strategies, Inc., for USEPA Region 5, August 8-11, 2000)

The Tier 1 I-69 Evansville to Indianapolis FEIS analyzed cumulative impacts using the 11-step method described in the CEQ handbook entitled “Considering Cumulative Effects Under the National Environmental Policy Act.” Three major resources, ecosystems, and human communities were identified and analyzed for cumulative impacts. Farmland, forests, and wetlands were selected based upon their importance in Southwestern Indiana as well as input from various resource agencies (see Section 5.26 of the Tier 1 FEIS). Tier 1 analyzed a 26-



county region through a forecast year of 2025. The Tier 1 EIS compared the overall projected loss of farmland, forest, and wetlands to the loss resulting from direct and indirect I-69 project impacts. The findings were that I-69 losses account for a very small percentage of overall losses for these three resources. The selected alternative—Alternative 3C—accounted for an additional 1.1% loss in farmland, 0.1% loss in forest, and 0.04% loss in wetlands throughout the 26-county project area. The impacts of the selected alternative were typical of the alternatives studied in the Tier 1 EIS; see Figures 5.26-8, 5.26-9, and 5.26-10 (pp. 5-292 through pp. 5-294) in the Tier 1 EIS.

The eleven-step process for conducting the cumulative impacts analysis is as follows:

1. Identify the significant cumulative effects issues associated with I-69.
2. Establish the geographic scope for the analysis.
3. Establish the time frame for the analysis.
4. Identify other actions affecting the resources, ecosystems, and human communities of concern.
5. Characterize the resources, ecosystems, and human communities identified in scoping and explain how they have historically changed.
6. Characterize the stresses affecting these resources, ecosystems, and human communities and their relation to regulatory thresholds.
7. Define a baseline condition for the resources, ecosystems, and human communities.
8. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities.
9. Determine the magnitude and significance of cumulative effects by identifying the changes as a result of I-69.
10. Modify or add alternatives to avoid, minimize, or mitigate significant cumulative impacts.
11. Monitor the cumulative effects of the alternatives and provide documentation.

The Tier 2 analysis follows a similar methodology in determining resources, impacts, and significant effects. Unlike Tier 1, the Tier 2 process considers a much more local study area and a more detailed analysis. The data from the Tier 1 analysis will be carried through Tier 2 and further refined. Per CEQ guidance, not all resources directly impacted by a project will require cumulative impact analysis. The resources identified for the cumulative analysis in I-69 Tier 2, Section 5 are farmland, forests, wetlands, streams, and karst including private drinking water supply wells. Other direct and indirect impact analyses are provided in other sections of **Chapter 5, *Environmental Consequences***. For example, historic resources and Section 106 analysis and consultation details are included in **Section 5.13, *Historic Resource Impacts***.

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Traffic Analysis Zone (TAZ)¹ data were found to be more favorable than Census Tract Block Group data for the analyses of indirect impacts because (1) compared to Census Tract Block Groups, TAZs are small in size, which permits more comprehensive data gathering and more detailed analysis, (2) the socioeconomic data for the TAZs (including population and employment statistics) was readily available, having been developed for each section of the Tier 2 I-69 project for use in forecasting traffic volumes, and (3) these analyses involve indirect impacts that may extend beyond the immediate vicinity of the project itself. Therefore, the Study Area for indirect effects follows TAZ boundaries rather than Census Tract Block Group boundaries.

To determine what land use changes –and, therefore, impacts to existing resources—could occur as a result of predicted induced development, it was necessary to identify existing land cover. Land cover was identified using the 2006 National Land Cover Database (NLCD) Zone 49 Land Cover Layer obtained from the United States Geological Survey (USGS). This 2006 NLCD for Zone 49 (southern half of Indiana) was made publicly available on February 16, 2011. Based on the Land Cover Codes in this data set, the land area of each TAZ that has induced growth was categorized, and land cover types within the categories identified as follows:

- *Developed: Open Water; Developed, Open Space; Developed, Low Intensity; Developed, Medium Intensity; and Developed, High Intensity.*
- *Unusable: Woody Wetlands; and Emergent Herbaceous Wetlands.*
- *Agriculture Land/Other: Barren Land (Rock/Sand/Clay); Shrub/Scrub; Grassland/Herbaceous; Pasture/Hay; and Cultivated Crops.*
- *Agriculture Land/Other in Floodplain: (Same cover type as Agriculture Land/Other, above.)*
- *Forest Land: Deciduous Forest; Evergreen Forest; and Mixed Forest.*
- *Forest Land in Floodplain: (Same cover type as Forest Land, above.)*

5.24.3 Analysis

The following section presents the analysis of the direct, indirect, and cumulative impacts of the project on farmland, forests, wetlands, streams, and karst. To facilitate this review, the historic and future trends of each resource have been researched, as well as anticipated land use changes identified by the “Expert Land Use Panel” (described in *Step 3*, below). These trends and potentially foreseeable land use changes were then utilized in determining the cumulative and

¹ A TAZ is one of many small areas within a larger geographical study area that has been subdivided for purposes of obtaining socioeconomic and traffic data in a manageable fashion. The geographical scope of Section 5 was identified as Monroe and Morgan counties. Changes in growth induced (positive or negative) by the I-69 Section 5 project (indirect impact) was predicted to occur in a total of 29 to 31 TAZs (depending on alternative) distributed within these two counties. See “2. Establish geographic scope for the analysis,” herein, for additional discussion.



indirect impacts on farmland, forest, wetlands, streams, and karst in the Tier 2 study of Section 5. The following discussion uses the 11-step process identified in **Section 5.24.2, Methodology**, to assess the overall cumulative impacts for Section 5. (Note that the first of these 11 steps includes within it, a nine-step process to identify indirect impacts. To avoid confusion, future references to the latter nine-step process for indirect impacts will employ the word “*Step*” followed by its number, in italics, *e.g.*, *Step 1*.)

1. Identify the significant cumulative effects issues associated with I-69.

This project is located within a potential karst features area based on the October 1993 Karst Memorandum of Understanding (MOU) between the Indiana Department of Transportation (INDOT), the Indiana Department of Natural Resources (IDNR), the Indiana Department of Environmental Management (IDEM), and the United States Fish and Wildlife Service (USFWS). It should be noted that for this project, FHWA and INDOT invited the USEPA to participate in the karst study and assessment. Coordination received from the USEPA on August 31, 2006, identified the sensitivity of karst resources within I-69 Tier 2 Sections 4 and 5, and recommended that potential karst impacts be carefully considered in the Tier 2 cumulative impacts analysis.

Upon review of existing data, mapping, and local coordination, in general, the streams and wetlands account for significantly smaller acreage than the agricultural land or forests in any given induced growth TAZ. Based on the ratio of available agricultural and forest land within TAZs with induced growth, an estimate of 35% of the induced growth occurring on agricultural land and 65% forest land was established based for Monroe County. An estimate of 55% agricultural land and 45% forest land was established for Morgan County. These percentages are applied where growth is expected to occur on non-developed land.

Table 5.24-1 shows the total amount of land, by land type and county, in the 29 to 31 TAZs predicted to experience growth as a result of the I-69 Section 5 project. The number of TAZs experiencing growth varies with alternative. Within the 31 TAZs predicted to experience growth related to Refined Preferred Alternative 8, land cover categorized as Agricultural/Other (in and out of a floodplain) represents 40% of the total acres in the TAZs compared with 41% forest, and 19% developed.

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Table 5.24-1: USGS NLCD: Amount of Land Cover Types in Induced Growth TAZs

County (# TAZs represented)	Developed (acres)	Unusable (acres)	Ag/Other in Floodplain (acres)	Available Ag/Other (acres)	Forest in Floodplain (acres)	Available Forest (acres)	Total Acres in TAZs
Alternative 4							
Monroe (16)*	1,636	0	266	1,941	302	3,485	7,629
Morgan (15)**	1,973	4	831	3,482	324	2,944	9,557
Total Acres (%)	3,609 (21%)	4 (0%)	6,520 (38%)		7,055 (41%)		17,186
Alternatives 5 7, 8, and Refined Preferred Alternative 8							
Monroe (15)*	1,459	0	347	2,037	409	3,680	7,931
Morgan (16)**	2,028	4	831	4,110	324	3,252	10,549
Total Acres (%)	3,487 (19%)	4 (0%)	7,325 (40%)		7,665 (41%)		18,480
Alternative 6							
Monroe (13)*	1,341	0	103	1,005	102	1,904	4,454
Morgan (16)**	2,028	4	831	4,110	324	3,252	10,549
Total Acres (%)	3,369 (22%)	4 (0%)	6,049 (40%)		5,582 (37%)		15,003
Source: USGS 2006 NLCD for Zone 49							
Cover types:							
<u>Developed</u> : Open Water; Developed, Open Space; Developed, Low Intensity; Developed, Medium Intensity; and Developed, High Intensity.							
<u>Unusable</u> : Woody Wetlands; and Emergent Herbaceous Wetlands.							
<u>Agriculture Land/Other</u> : Barren Land (Rock/Sand/Clay); Shrub/Scrub; Grassland/Herbaceous; Pasture/Hay; and Cultivated Crops.							
<u>Forest Land</u> : Deciduous Forest; Evergreen Forest; and Mixed Forest.							
* Monroe County: Induced growth in these TAZs is anticipated to impact 35% agricultural land / 65% forest. These percentages are applied where growth is expected to occur on non-developed land.							
** Morgan County: Induced growth in these TAZs is anticipated to impact 55% agricultural land / 45% forest. These percentages are applied where growth is expected to occur on non-developed land.							

In some TAZs, the land is so attractive for future development that the No Build and Build project growth (based upon the household or jobs development ratios) actually exceeds the amount of “available” agricultural and forest land. In these situations, the development is occurring on land that is already developed and would result in greater densities. **Table 5.24-2** shows the acreage of projected induced growth that is expected to occur on developed land rather than agricultural or forest land. Examples of induced development resulting in greater densities includes a high-rise apartment building that would exceed the 4.82 households/acre value for Monroe County or when existing buildings would be replaced by larger or taller buildings.

For Monroe County, it is projected that 38 to 48 acres of induced growth will occur on agricultural and forest lands, while 0 to 10 acres will occur on developed land (dependent on alternative). Assuming 35% of the anticipated 38 to 48 acres of induced growth caused by Section 5 will occur on available agricultural lands, the predicted impact to agricultural lands is



13 to 17 acres. For Monroe County, assuming the remaining 65% of the 38 to 48 acres will occur on forest lands, the predicted impact ranges from 25 to 31 acres.

For Morgan County, it is projected that 34 to 36 acres of induced growth will occur on agricultural and forest lands, while 11 to 13 acres will occur on developed land (dependent on alternative). Assuming 55% of the anticipated 34 to 36 acres of induced growth caused by Section 5 will occur on available agricultural lands, the predicted impact to agricultural lands is 19 to 20 acres. For Morgan County, assuming the remaining 45% of the 34 to 36 acres will occur on forest lands, the predicted impact ranges from 15 to 16 acres.

Table 5.24-2 summarizes the acres of land use type potentially converted by induced growth with each Section 5 alternative. The total estimated induced growth impacts for the Section 5 project are 95 acres of which, 11 to 23 acres are increased densities on developed land, 32 to 37 acres are agricultural land, and 40 to 47 acres are forest land.²

Table 5.24-2: Acres of Land Use Type Potentially Converted with Section 5 Induced Growth, by Alternative

County	Alternative 4			Alternatives 5,7, 8, and Refined Preferred Alternative 8			Alternative 6		
	Dev.	Ag.	Forest	Dev.	Ag.	Forest	Dev.	Ag.	Forest
Monroe Co.	10	13	25	0	17	31	10	13	25
Morgan Co.	13	19	15	11	20	16	11	20	16
Total	23	32	40	11	37	47	21	33	41

Sources:

Appendix AA, Indirect Impact Analysis (Table 1).

Table 5.24-3, Induced growth in Monroe County TAZs is anticipated to convert 35% agricultural / 65% forest land.

Table 5.24-3, Induced growth in Morgan County TAZs is anticipated to convert 55% agricultural / 45% forest land.

Dev. = Developed Land Use Ag.= Agricultural Land Use Forest = Forested Land Use

Past history and future development potential were used to determine impacts to wetlands, forests, and streams. A more in-depth process was used for Tier 2 to address the impacts to farmland and karst. To estimate indirect impacts to land use, the following nine-step process was used:

Step 1: Obtain the economic forecasts for 2035 from Tier 1 that assumes the construction of the selected alternative, Alternative 3C. This provides the induced or indirect growth resulting from I-69 for the forecast year for Tier 2.

² The geographic scopes of the cumulative impact analyses in adjacent sections of I-69 of necessity overlap. As a result, some actions will be counted as cumulative impacts in more than one Tier 2 EIS; thus, the cumulative impacts of the I-69 project as a whole cannot be calculated by “adding up” the cumulative impacts totals that are given in each Tier 2 EIS.

Section 5—Final Environmental Impact Statement

Prior to determining the magnitude and significance of the cumulative effects in Section 5, an analysis was completed for anticipated land use changes in the Section 5 study area. Several scenarios were identified by reviewing the TAZ data estimates for the No Build scenario and for the five alternatives. For instance, maps of TAZs within Monroe and Morgan counties were used to identify where project-induced land use changes would be expected to occur. The number of new houses and new jobs by the year 2035 were forecasted by TAZ for both the No Build scenario and for the six alternatives. Induced growth is anticipated to occur where the number of houses or jobs for the alternatives is higher than for the No Build scenario. As expected, the build alternatives would result in more employment and housing than the No Build scenario for the two-county area. The Tier 1 economic forecasts indicated that building I-69 would induce 337 new housing units and 350 new jobs in Monroe and Morgan Counties, the geographic scope for the Section 5 project. **Figure 5.24-1** (figures are located at the end of the chapter unless otherwise noted) and **Table 5.24-3** show the location of the TAZs with predicted induced growth under any of the five alternatives.

Step 2: Allocate the induced growth to individual counties.

These forecasts were allocated in Tier 1 to the two individual counties, as follows:

- 186 jobs and 181 housing units within Monroe County
- 164 jobs and 156 housing units within Morgan County

These forecasts of induced jobs and housing units at the county level include the induced growth effects of all of the other Sections of I-69. This would include induced growth effects associated with the Section 4 interchanges in southern Monroe County, and with the proposed Section 6 interchanges in Morgan County. The distribution of these county-level induced growth effects specifically to the TAZs influenced by Section 5 is discussed in the following sections.

Step 3: Meet with the Expert Land Use Panel to determine the location and comparative order of magnitude of growth by TAZ.

Estimating indirect impacts relied upon input from an Expert Land Use Panel assembled for Section 5. According to a United States Department of Transportation (USDOT) report,³ “Expert panels can be a very effective way to organize input and gain general consensus on the range of impacts that might be expected. The use of expert panels seems to be an effective way to determine what is ‘reasonably foreseeable’ since it utilized the judgments of reasonable people.” The Section 5 Expert Land Use Panel included representatives from Monroe County, Bloomington-Monroe Metropolitan Planning Organization (MPO), City of Bloomington, Town of Ellettsville, Morgan County, City of Martinsville, Bloomington Board of Realtors, Indiana University, local real estate offices, and other stakeholder groups

³ “Environmental Stewardship and Transportation Infrastructure Project Review: Executive Order 13274 Indirect and Cumulative Impacts Work Group Draft Baseline Report.” ICF Consulting for USDOT. March 15, 2005.



with knowledge of local land use. The Expert Land Use Panel was first convened in February 2005 to review the 2030 land use projections. Initially, a panel was developed for Monroe County and a separate panel for Morgan County. Both expert panels participated in a series of two meetings in 2005. In October of 2011, the panels were consolidated and re-engaged to review the 2035 land use projections. Four Expert Land Use Panel meetings were held between October 2011 and February 2012 to discuss household and employment allocation in both Monroe and Morgan counties.

The Expert Land Use Panels were convened to inform the study team's assessment of the potential for Section 5 of I-69 to influence the location and intensity of future growth in the Study Area. The panel indicated those TAZs that they felt would be most likely to experience induced growth with the new interchanges to be provided by I-69 in Section 5. They determined that indirect impacts would differ among alternatives based upon different interchanges which each provides. Minutes of the meetings with the Expert Land Use Panels are presented in **Appendix E**, *Expert Land Use Panel Meeting Notes*.

Step 4: Using these growth guidelines from the expert panels, allocate the induced growth for the counties to individual TAZs in proportion to the relative order of magnitude established by the Expert Land Use Panels.

The Expert Land Use Panels focused on the TAZs within the two counties to determine the order of magnitude of growth that can be expected within each TAZ. The panels then allocated the anticipated induced growth in housing units and employment into each TAZ, as shown in **Table 5.24-3** and on **Figures 5.24-4 A-C**.



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Table 5.24-3: Number of Jobs, Households, and Acres Induced With I-69 Section 5 Alternatives

Traffic Analysis Zone (TAZ)	Alternative 4						Alternatives 5, 7, 8, and Refined Preferred Alternative 8						Alternative 6					
	Induced Number of Housing Units	Induced Number of Jobs	Induced Acres for Housing*	Induced Acres for Jobs**	Total Induced Acres Changes & % of Total TAZ Acres	Size of TAZ (acres)	Induced Number of Housing Units	Induced Number of Jobs	Induced Acres for Housing*	Induced Acres for Jobs**	Total Induced Acres Changes & % of Total TAZ Acres	Size of TAZ (acres)	Induced Number of Housing Units	Induced Number of Jobs	Induced Acres for Housing*	Induced Acres for Jobs**	Total Induced Acres Changes & % of Total TAZ Acres	Size of TAZ (acres)
Monroe County***																		
5300426	29	0	6.0	0.0	6.0	242	0	5	0.0	0.3	0.3	242	21	0	4.4	0.0	4.4	242
5300728	-	-	-	-	-	-	0	7	0.0	0.4	0.4	416	-	-	-	-	-	-
5300901	7	0	1.5	0.0	1.5	370	5	0	1.0	0.0	1.0	370	-	-	-	-	-	-
5300903	36	0	7.5	0.0	7.5	694	26	0	5.4	0.0	5.4	694	8	0	1.7	0.0	1.7	694
5300904	7	0	1.5	0.0	1.5	1163	6	0	1.2	0.0	1.2	1163	-	-	-	-	-	-
5300905	12	0	2.5	0.0	2.5	1709	9	0	1.9	0.0	1.9	1709	-	-	-	-	-	-
5300907	11	0	2.3	0.0	2.3	556	9	0	1.9	0.0	1.9	556	2	0	0.4	0.0	0.4	556
5300911	14	0	2.9	0.0	2.9	562	10	0	2.1	0.0	2.1	562	3	0	0.6	0.0	0.6	562
5301504	32	0	6.6	0.0	6.6	211	-	-	-	-	-	-	23	0	4.8	0.0	4.8	211
5301511	13	0	2.7	0.0	2.7	122	-	-	-	-	-	-	9	0	1.9	0.0	1.9	122
5301903	0	3	0.0	0.2	0.2	429	0	3	0.0	0.2	0.2	429	0	2	0.0	0.1	0.1	429
5302301	0	7	0.0	0.4	0.4	173	112	0	23.2	0.0	23.2	173	105	0	21.8	0.0	21.8	173
5302501	6	0	1.2	0.0	1.2	230	4	0	0.8	0.0	0.8	230	-	-	-	-	-	-
5303311	0	17	0.0	1.0	1.0	78	-	-	-	-	-	-	0	10	0.0	0.6	0.6	78
5303502	14	0	2.9	0.0	2.9	187	0	3	0.0	0.2	0.2	187	10	0	2.1	0.0	2.1	187
5303601	-	-	-	-	-	-	0	36	0.0	2.0	2.0	297	0	19	0.0	1.1	1.1	297
5304601	0	81	0.0	4.6	4.6	321	0	67	0.0	3.8	3.8	321	0	78	0.0	4.4	4.4	321
5304603	0	78	0.0	4.4	4.4	582	0	65	0.0	3.7	3.7	582	0	77	0.0	4.3	4.3	582
Monroe County Subtotals*	181	186	37.4	10.6	48 0.6%	7,629	181	186	37.5	10.6	48 0.6%	7,931	181	186	37.7	10.5	48 1.1%	4,454
Morgan County****																		
5500407	21	0	4.8	0.0	4.8	2,021	29	0	6.6	0.0	6.6	2,021	29	0	6.6	0.0	6.6	2021
5500408	19	0	4.3	0.0	4.3	2,196	26	0	5.9	0.0	5.9	2,196	26	0	5.9	0.0	5.9	2196
5500504	0	14	0.0	1.0	1.0	687	0	14	0.0	1.0	1.0	687	0	14	0.0	1.0	1.0	687
5500507	0	6	0.0	0.4	0.4	1474	0	6	0.0	0.4	0.4	1474	0	6	0.0	0.4	0.4	1474
5500601	0	8	0.0	0.5	0.5	264	0	8	0.0	0.5	0.5	264	0	8	0.0	0.5	0.5	264
5500814	0	14	0.0	1.0	1.0	460	0	14	0.0	1.0	1.0	460	0	14	0.0	1.0	1.0	460
5500903	0	10	0.0	0.7	0.7	110	0	10	0.0	0.7	0.7	110	0	10	0.0	0.7	0.7	110



Table 5.24-3: Number of Jobs, Households, and Acres Induced With I-69 Section 5 Alternatives																		
Traffic Analysis Zone (TAZ)	Alternative 4						Alternatives 5, 7, 8, and Refined Preferred Alternative 8						Alternative 6					
	Induced Number of Housing Units	Induced Number of Jobs	Induced Acres for Housing*	Induced Acres for Jobs**	Total Induced Acres Changes & % of Total TAZ Acres	Size of TAZ (acres)	Induced Number of Housing Units	Induced Number of Jobs	Induced Acres for Housing*	Induced Acres for Jobs**	Total Induced Acres Changes & % of Total TAZ Acres	Size of TAZ (acres)	Induced Number of Housing Units	Induced Number of Jobs	Induced Acres for Housing*	Induced Acres for Jobs**	Total Induced Acres Changes & % of Total TAZ Acres	Size of TAZ (acres)
5501005	10	0	2.3	0.0	2.3	701	14	0	3.2	0.0	3.2	701	14	0	3.2	0.0	3.2	701
5501009	13	0	3.0	0.0	3.0	69	18	0	4.1	0.0	4.1	69	18	0	4.1	0.0	4.1	69
5501013	15	0	3.4	0.0	3.4	68	21	0	4.8	0.0	4.8	68	21	0	4.8	0.0	4.8	68
5501015	33	24	7.5	1.6	9.1	281	48	11	11.0	0.8	11.8	281	48	11	11.0	0.8	11.8	281
5501016	0	24	0.0	1.6	1.6	64	0	11	0.0	0.8	0.8	64	0	11	0.0	0.8	0.8	64
5501706	0	44	0.0	3.0	3.0	604	0	30	0.0	2.1	2.1	604	0	30	0.0	2.1	2.1	604
5501726	-	-	-	-	-	-	0	30	0.0	2.1	2.1	992	0	30	0.0	2.1	2.1	992
5502308	23	10	5.3	0.7	6.0	305	0	15	0.0	1.0	1.0	305	0	15	0.0	1.0	1.0	305
5502309	22	10	5.0	0.7	5.7	253	0	15	0.0	1.0	1.0	253	0	15	0.0	1.0	1.0	253
Morgan County Subtotals	156	164	35.6	11.2	47 0.5%	9,557	156	164	35.6	11.4	47 0.4%	10,549	156	164	35.6	11.4	47 0.4%	10,549
Total	337	350	73	22	95 0.7%	17,186	337	350	73	22	95 0.5%	18,480	337	350	73	22	95 0.6%	15,003
Sources: BLA TAZ Shapefiles, May 2012 (Year 2010) and June 2012 (Year 2035)																		
Notes:																		
*Monroe County utilized 4.82 units/acre; Morgan County used 4.38 units/acre.																		
**Monroe County utilized 17.8 jobs/acre; Morgan County used 14.6 jobs/acre.																		
***Induced growth in these Monroe County TAZs was independently verified by the Section 5 Expert Land Use Panel and is anticipated to affect 35% agricultural / 65% forest land. These percentages are applied where growth is expected to occur on non-developed land.																		
****Induced growth in these Morgan County TAZs was independently verified by the Section 5 Expert Land Use Panel and is anticipated to affect 55% agricultural / 45% forest land. These percentages are applied where growth is expected to occur on non-developed land.																		
Subtotals have been rounded.																		



Steps 5 and 6: Determine any shifts in employment resulting from accessibility changes as a result of interchanges. Allocate any shifts in employment to the TAZs; and, determine a value for I-69-induced growth and growth from employment shifts resulting from changes in accessibility for each TAZ.

Shifts in employment resulting from accessibility changes are anticipated in the induced growth TAZs surrounding the new interchanges. For example, shifting may occur as a result of new businesses such as medical, science and technology, engineering, manufacturing, assembly, distribution, gas stations, hotels, and restaurants which may choose to locate at these interchanges creating new jobs in the area. See **Figures 5.24-4 A-C** for the location of these TAZs.

Step 7: Convert the growth into acres of developed land uses based on values from “Trip Generation – 6th Edition” from the ITE, 1997.

The number of induced housing and new jobs was converted to acres of induced new development based on the following assumptions:

The Tier 1 economic analysis determined that within Monroe County the average number of dwelling units per acre was 4.82, while in Morgan County, the average number of dwelling units per acre was determined to be 4.38. These estimates were based on a combination of three single-family dwelling units per acre and seven multi-family units per acre, weighted by the percent of single-family verses multi-family units. These estimates were also used for Tier 2.

The Tier 1 economic analysis determined that within Monroe County the average number of jobs per acre was 17.8, while in Morgan County, the average number of jobs per acre was determined to be 14.6. The Tier 1 economic analysis for jobs was based on a weighted average of the standard employees per acre by employment type. The employees-per-acre, per-employment-type data were developed from the ITE Code per Trip Generation 6th Edition, and are as follows: 18.5 employees per acre for Durable Manufacturing and Non-Durable Manufacturing jobs; 8.2 employees per acre for Mining, Construction, Transportation Public & Utilities, and Agricultural Service jobs; 55.8 employees per acre for Finance, Insurance, Real Estate, and Services jobs; 8.7 employees per acre Retail Trade jobs; and 14.7 employees per acre Wholesale Trade jobs.

The forecasted 337 new housing units in Section 5 will require conversion of 73 acres, and the forecasted 350 jobs will require conversion of 22 acres, using the averages developed for the two counties. Combined, a total of 95 acres of indirect land use changes are anticipated to occur as a result of building the project. The geographic scopes of the cumulative impact analyses for Section 5 will overlap with those in adjacent sections (Sections 4 and 6) of I-69. Some cumulative impacts will be counted in more than one Tier 2 EIS; thus, the cumulative impacts of the I-69 project as a whole cannot be calculated by “adding up” the cumulative impacts totals that are given in each Tier 2 EIS.

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Step 8: Determine which resources will be impacted by these changes in land use in each TAZ.

Farmland, forest, streams, wetlands, and karst are the principal resources that the project's indirect land use changes would potentially affect. I-69 Section 5 is much more developed than Sections 1 through 4 where it was determined that all induced growth would occur on farmland or forests. Due to the existing development patterns, the amount of "available" farmland or forest is limited in some TAZs, and induced growth would result in higher densities on already developed lands. A conservative estimate of the amount of available farmland and forested land was developed based on 2006 NLCD in each TAZ with induced development.

Given the availability of agricultural land in the more desirable locations, it is reasonable to assume that, in the foreseeable future, 35% of induced development that will occur on non-developed land in Monroe County would occur on available agricultural land and 55% in Morgan County. Conversely, 65% of induced development on non-developed land in Monroe County would occur on available forest land and 45% in Morgan County.

A total of 95 acres of induced growth would be anticipated in all build alternatives. Due to the developed land uses along the corridor, it is assumed that 11 to 23 acres of induced development would result in higher densities on already developed land. The remaining 72 to 84 acres of induced growth would result in the conversion of agricultural lands and forests to housing units and employment areas. In Monroe County assuming 35% of induced growth on non-developed land resulting from Section 5 will affect available agricultural lands and 65% would affect available forest, the predicted impact ranges from 13 acres of agricultural land and 25 acres of forest impacts in Alternatives 4 and 6 to 17 acres of agricultural land and 31 acres of forest impacts in Alternatives 5, 7, 8, and Refined Preferred Alternative 8. In Morgan County assuming 55% of induced growth on non-developed land resulting from Section 5 will affect available agricultural lands and 45% would affect available forest, the predicted impact ranges from 19 acres of agricultural land and 15 acres of forest impacts in Alternative 4 and 20 acres of agricultural land and 16 acres of forest impacts in Alternatives 5, 6, 7, 8, and Refined Preferred Alternative 8. Collectively in the TAZs that are anticipated to experience induced growth, agricultural lands and forest are the predominant land uses, with ranges between 37 and 41% (see **Table 5.24-1**).

Step 9: Use these indirect impacts to the resources in the cumulative impact analysis.

The cumulative impact analysis includes the consideration of direct and other impacts to farmland, forests, streams, wetlands, and karst resources, as well as the indirect impacts quantified above.

2. Establish the geographic scope for the analysis.

The Section 5 Study Area used for both the economic impact analysis (**Section 5.5, Economic Impacts**) and this cumulative impact analysis is different than the year 2010 Census Tract Block Group or Census Tract boundaries that comprise the Study Area in other sections of this document. The use of a different study area was necessary for these two analyses because TAZ data is used to analyze economic and cumulative impacts, and the TAZ boundaries do not



precisely correspond with the census-based boundaries that define the Section 5 Study Area for other purposes. The study area defined for the cumulative impacts analysis is referred to as the “geographic scope,” which, for Section 5 consists of Monroe and Morgan counties, within which direct, indirect, and “other” impacts are identified. The geographic scope is also referred to as the Indirect Impact Study Area, which is comprised of 609 TAZs associated with the Section 5 geographic scope, within Monroe and Morgan counties. Of these TAZs, 29 to 31 are projected to experience induced growth with each of the build alternatives (see **Figures 5.24-4 A-C**).

Maps of TAZs within Monroe and Morgan counties were used to identify where project-induced land use changes would be expected to occur. The number of new houses and new jobs by the year 2035 were forecasted by TAZ for both the No Build scenario and for the Build scenario. Induced growth is anticipated to occur where the numbers for the Build scenario are higher than for the No Build scenario.

The Expert Land Use Panels, described in *Step 3* above, were consulted to analyze the project’s impacts within the geographic scope. These local representatives used knowledge of local property conditions, development patterns, vacant land development constraints, vacant lots, and availability of infrastructure to establish the anticipated magnitude of population and employment growth by TAZ. Maps of the TAZs within Monroe and Morgan counties were presented to the Expert Land Use Panels for verification or revision and to determine the probable location and order of magnitude of the growth in population and employment. The panel gave specific consideration to the areas surrounding proposed interchanges as having high potential for development.

The information that the Expert Land Use Panels provided helped to determine which TAZs would be more likely to experience future growth as a result of building I-69. As described in *Step 4* and *Step 5* above, the panel allocated the induced growth to TAZs, distributing the forecasted households and employment induced growth among the 609 TAZs in Monroe and Morgan Counties. These 609 TAZs comprise the Indirect Impact Study Area for this analysis. The panels allocated this growth to 29 to 31 TAZs (depending on alternative), all in the vicinity of the proposed interchanges; see **Figures 5.24-4 A-C**. For the purpose of estimating the induced growth caused by each build alternative in Section 5, the Expert Land Use Panels assumed that the following interchanges would be constructed:

- Alternative 4: Fullerton Pike, SR 45/2nd Street, SR 48/3rd Street, SR 46, Sample Road, Kinser Pike, and Paragon Road/Pine Boulevard
- Alternatives 5, 7, and 8: Fullerton Pike, SR 45/2nd Street (including split with Tapp Road), SR 48/3rd Street, SR 46, N Walnut Street, Sample Road, and Liberty Church Road
- Alternative 6: Fullerton Pike, SR 45/2nd Street, SR 48/3rd Street, SR 46, Sample Road, and Liberty Church Road
- Refined Preferred Alternative 8: Same interchanges as evaluated in Alternatives 5, 7, and 8.

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The panel also provided insight on where land use changes would likely occur regardless of whether I-69 was constructed (i.e., the No Build scenario). As expected, the Build scenario shows more employment and housing than the No Build scenario for the two-county area.

3. Establish the time frame for the analysis.

The time period studied for this cumulative impact analysis includes past years through the present day to the year 2035. Available information has guided the extent of the past analysis. Information for farmland was available back to 1900. Information for forests and wetlands were estimated back 200 years. Stream data has come from the last 100 years, while the karst data is more recent. For the future analysis, the year 2035 is also the future analysis year for the economic modeling and the transportation modeling.

The year 2035 is the future analysis horizon for the transportation modeling and the population and employment forecasts, and is therefore the time horizon for the Tier 2 cumulative effects analysis. The Tier 2 process used the same base traffic modeling tools and forecasting methodologies as were used in Tier 1 for consistency. The various GIS layers of information used in Tier 1 have been updated with new information, which was used in the cumulative impacts analysis for Tier 2.

4. Identify other actions affecting the resources, ecosystems, and human communities of concern.

The analysis of cumulative impacts for the Tier 2 I-69 project in Section 5 considered the I-69 direct and indirect impacts as well as the impacts from other major federal, state, and private sector actions in the Indirect Impact Study Area not related to the I-69 project.

Foremost among the “other actions” that will affect the geographic scope is the summation of all of the minor normal changes and natural growth in both population and employment that is expected to occur by the year 2035 whether I-69 is built or not. These population and employment forecasts form the baseline condition for land use changes by 2035. The “No Build” population forecasts⁴ have been determined based on birth rate, death rate, in migration, and out migration, and are independent of the I-69 project. This component of growth is referred to in this chapter as “Other Projected Growth.” **Table 5.24-4** is based on the change from base year 2010 TAZs to the 2035 No Build TAZ forecasts.

⁴ The “No Build” term refers only to the assumption regarding construction of the new I-69 highway. The normal growth and minor incremental changes expected during the time period, referred to here as “Other Projected Growth,” are understood to be included in the “No Build” scenario, but not any growth induced by the construction of I-69 or the major “Other” projects discussed in this chapter.



Table 5.24-4: Other Projected Growth Within Section 5 Geographic Scope (No Build Scenario)

I-69 Section 5 Geographic Scope	Year 2010 (by TAZ)			Year 2035 (by TAZ)			Increase by Year 2035		
	Population	Households	Total Employment	Population	Households	Total Employment	Increase in Population, Number and %	Increase in Households, Number and %	Increase in Employment, Number and %
Monroe County	137,974	54,864	84,703	176,947	73,604	112,565	38,973 28%	18,740 34%	27,862 33%
Morgan County	68,894	25,765	19,976	85,635	33,851	26,284	16,741 24%	8,086 31%	6,308 32%
Totals	206,868	80,629	104,679	262,582	107,455	138,849	55,714 27%	26,826 33%	34,170 33%

Source: BLA TAZ Shapefiles, May 2012 (Year 2010) and June 2012 (Year 2035)

As shown in **Table 5.24-4**, Monroe County is projected to have the larger increase in population under the No Build forecasts, approximately 28% from 2010 to 2035. Morgan County is estimated to increase population by approximately 24%. Monroe County is forecast to increase the most in total employment, with an increase of nearly 33%. Morgan County's employment is expected to increase by 32%. Overall, the Section 5 geographic scope will see a 27% increase in population, a 33% increase in households, and a 33% increase in total employment with the No Build scenario.

Using the same land conversion ratios presented in *Step 7* of the indirect impact analysis (above), estimates were prepared for the amount of undeveloped land that would need to be converted to accommodate these totals of new households and employment expected to occur with the No Build scenario, whether I-69 is constructed or not. The Expert Land Use Panel again reviewed the TAZ maps to provide insight on where these land use changes would likely occur.

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Table 5.24-5: Land Use Changes By 2035 for the No Build Scenario

I-69 Section 5 Geographic Scope	Increase in Households	Acres for New Housing*	Increase in Employment	Acres for New Employment**	Total Acres for No Build Growth (Unconstrained)	Equivalent Development Acres in TAZs without Open Land	Total Acres of No Build Growth (Constrained)
Monroe County	18,740	3,888	27,862	1,565	5,453	-1,898	3,555
Morgan County	8,086	1,846	6,308	432	2,278	-205	2,073
Totals	26,826	5,734	34,170	1,997	7,731	-2,103	5,628
*Monroe County utilized 4.82 units/acre; Morgan County used 4.38 units/acre.							
**Monroe County utilized 17.8 jobs/acre; Morgan County used 14.6 jobs/acre.							

In **Table 5.24-5**, a computation for acreage impacted due to the growth in population and employment in the No Build scenario was made using the units per acre calculation factors as shown in the table for each county. The result of this calculation is shown in the column labeled “Total Acres for No Build Growth (Unconstrained).” A detailed review of the TAZs where this growth was forecasted to occur indicated that applying these factors in 351 of the Monroe County TAZs and 258 of the Morgan County TAZs resulted in forecasted impacts to land use which exceeded the availability of undeveloped land, as shown in the year 2006 NLCD.

For this analysis, it was assumed (for those TAZs where the forecasted impacts to open land exceeded the available amount of open land) that the added population and employment would use all available open (non-developed) land, but that these TAZs would also see developed land go to a higher level of development. For example, single-story office buildings may be replaced by a two- or three-story office building. The 1,898 acres subtracted from the “unconstrained” No Build growth in Monroe County and 205 acres in Morgan County takes into account that population and employment growth in a TAZ can affect no more than the remainder of any available land. **Appendix AA, Indirect Impact Analysis**, provides more details about these calculations.

In addition, information on other major development projected to occur (whether or not the project is constructed) was obtained through a review of local land use plans where such plans exist and from discussions with representatives of local governments, local and regional economic development groups/agencies, and major employers. The results of this review



indicated the following “other” reasonably foreseeable major future actions (by the year 2035) could add to the project’s potential direct and indirect impacts:

I-69 Evansville to Indianapolis: Section 4—FHWA’s March 2004 Tier 1 Record of Decision (ROD) for the Evansville to Indianapolis project selected a corridor for I-69 between Evansville and Indianapolis. In addition, the Tier 1 ROD divided the Evansville to Indianapolis project into six separate sections for more detailed Tier 2 studies. The central portion of these six sections includes Sections 3, 4, and 5. Section 4 begins at US 231 (near Crane Naval Surface Warfare Center) in Greene County, Indiana, and ends at the intersection of Victor Pike Road and SR 37 in Monroe County, which is the beginning of Section 5. It is important to note that all traffic modeling conducted for the I-69 Evansville to Indianapolis project takes into account that this project will be constructed. The FHWA issued the ROD on September 8, 2011, for Section 4 Refined Preferred Alternative 2.

The potential direct impacts from Section 4 within Section 5’s geographic scope were included in the Tier 2 Section 4 FEIS analysis. This includes Section 4’s subsection in Monroe County. The geographic scopes of the cumulative impact analyses in adjacent sections of I-69 will of necessity overlap. As a result, some actions will be counted as cumulative impacts in more than one Tier 2 EIS; thus, the cumulative impacts of the I-69 project as a whole cannot be calculated by “adding up” the cumulative impacts totals that are given in each Tier 2 EIS.

Section 5’s geographic scope consists of Monroe and Morgan counties. Potential direct impacts to the five identified resources within Section 5’s geographic scope as a result of the Section 4 project (based on design right-of-way as of August 22, 2012 within Monroe County) include:

- Farmland 209 acres
- Forests 335 acres
- Wetlands 0.15 acres (not including open water features)
- Streams 39,985 linear feet
- Karst 140 features

These direct impacts will be offset by mitigation measures incorporated into the Section 4 project, with both forest and wetland impacts being mitigated at ratios greater than 1 to 1. The totals presented in this Section 5 cumulative impact analysis do not include the mitigation totals from Section 4.

I-69 Evansville to Indianapolis: Section 6—Section 6 begins at SR 39 in Morgan County, Indiana south of Martinsville, and continues north along the existing SR 37 alignment to I-465 in Indianapolis, Indiana. The direct impacts from Section 6 within Section 5’s geographic scope were included in this analysis. This includes portions of Section 6’s alternatives in Morgan County. The potential direct impacts to the five identified resources within the geographic scope of Section 5 as a result of the Section 6 project (based on the Tier 1 BA Addendum Representative Alignment in Morgan County) are as follows:

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- Farmland 359 acres
- Forests 209 acres
- Wetlands 3.80 acres
- Streams 47,700 linear feet
- Karst 0 features

As with Section 4, the direct impacts to forests, wetlands and streams will be mitigated, but those totals are not included in this analysis.

Limestone Quarrying—There are several active limestone quarries in the project area. There has been relatively little change in quarry land use in Monroe County over the past 50 years. The current trend is for limestone companies to reopen former mines rather than starting work at a new site. Active quarry or milling sites include C&H Stone off of Fullerton Pike, B. G. Hoadley (3 facilities – Rockport, Tapp, active mill on Arlington Road), and Reed off of Prow Road.

Fullerton Pike Corridor Improvements—While the 2035 No Build includes planned and approved projects such as local transportation improvements, one project of note is the Fullerton Pike Corridor Improvements. This project would extend from SR 37 to the east to South Sare Road, and will utilize portions of the existing West Fullerton Pike, West Gordon Pike, and East Rhorer Road for approximately three miles. The final engineering assessment was completed June 2012 for this local project. The extent and type of resources potentially affected have not been determined but will be documented in an Environmental Assessment (EA) for the project. On February 4, 2013 the I-69 Project Team met with Monroe County to further coordinate the I-69 and Fullerton Pike projects.

Discussion of potential impacts to the North Clear Creek Historic Landscape District is included in **Section 5.13.4, *Effects Evaluation***. **Section 5.21.3.4, *Karst Impacts by Alternative***, and **Table 5.21-2** summarize the direct Section 5 project impacts on karst in the Fullerton Pike interchange area.

Tax Increment Finance (TIF) Districts—TIF is a type of financing that permits local governments to finance the redevelopment of target areas and enhance the economic development of rapidly developing areas. Additional TIF district context is provided in **Section 2.3.4, *Local Economic Development***. For Section 5, six TIF districts have been identified as relevant to the I-69 project; three are located in the City of Bloomington and three are located just outside the city limits in Monroe County. The City of Martinsville has also approved four TIF districts within its existing city limits and plans to annex portions of Morgan County to expand city limits.



Fullerton Pike TIF

This TIF district is located on the south side of Fullerton Pike, bounded by Rockport Road to the east and SR 37 to the west (see **Chapter 2, Purpose and Need, Figure 2-7**). The district lies outside of the Bloomington city limits and, therefore, falls under the planning jurisdiction of Monroe County. The Fullerton Pike TIF Area and associated boundaries were adopted on February 26, 2006 via Monroe County Redevelopment Commission Resolution. Eighty acres are included in its boundary, 63 of which are available for development.

State Road 37/Tapp Road TIF

This TIF district is located on the north and south sides of Tapp Road and east of SR 37 to the eastern boundary of the Woolery Farm Planned Unit Development (PUD) (see **Chapter 2, Purpose and Need, Figure 2-7**). The original 216-acre TIF district was established by City of Bloomington Resolution # 93-16. It was later amended by Resolution # 03-03 to include 25 additional acres to the east of S Weimer Road (the Woolery Farm PUD).

Whitehall/West Third TIF

This TIF district is located roughly between SR 48/3rd Street to the south and the CSX Railroad tracks to the north on both the east and west sides of SR 37 (see **Chapter 2, Purpose and Need, Figure 2-7**). The original 113-acre district was established by City of Bloomington Resolution # 98-04. It was later amended by Resolution # 00-03 to include 10 acres east of SR 37, south of SR 48/3rd Street. The goal of the TIF district was to use revenues from the Whitehall Crossing retail district to fund road improvements in the area.

Westside TIF

This TIF district is located roughly between SR 48/3rd Street to the south and just shy of Woodyard Road to the north, on the west side of SR 37 (see **Chapter 2, Purpose and Need, Figure 2-7**). The district lies outside of the Bloomington city limits, and therefore falls under the planning jurisdiction of Monroe County. The Westside TIF and associated boundaries were approved on February 25, 1993, and have been expanded since then, most recently via Monroe County Redevelopment Commission Resolution 2008-01. A total of 625 acres are included in its boundary.

Bloomington TIF (also referred to as North Park TIF)

The Bloomington, or North Park TIF District consists of approximately 1,165 acres located west of SR 37 and roughly bisected by SR 46 (see **Chapter 2, Purpose and Need, Figure 2-7**). The district lies outside of the Bloomington city limits and, therefore, falls under the planning jurisdiction of Monroe County. The 46 Corridor Economic Development Area and associated boundaries were adopted on January 2, 2002, via Monroe County Redevelopment Commission Resolution 2002-01.

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Kinser Pike/Prow Road TIF

This TIF district was established by City of Bloomington Resolution # 96-08 and covers approximately 161 acres east of SR 37 between Acuff Road and Kinser Pike (see **Chapter 2, Purpose and Need, Figure 2-7**). According to the City of Bloomington Growth Policies Plan, the district is “designated for employment, as defined in the Land Use Categories section of the Plan.”

Martinsville TIF and Annexation

In March 2011 the Martinsville Common Council gave final approval to establish four TIF districts. The establishment of TIF districts is designed to generate revenue in the districts from increases in assessments. The money generated could be used in a variety of ways, such as helping reduce the cost of property acquisition or equipment for a business or to help pay for the cost of increasing sewer capacity for the district. The money generated within the district must be spent for improvements within the district unless it is for something that would benefit all of the districts, such as a satellite fire station or 911 service center. The four districts are located north of the Section 5 study area and include:

- **Morgan Street Corridor** – includes downtown Martinsville and extends west along Morgan Street to SR 39 and east to Morgan Hospital and Medical Center, the Morgan County Fairgrounds and from Hospital Drive to SR 37.
- **Ohio Street Corridor** – includes Artesian Square Shopping Center, the site of the former Harman-Becker plant and Twigg Corp.
- **SR 37 Southeast Corridor** – is the closest TIF to Section 5. It includes the Grand Valley Boulevard shopping area and extends southwest to Mahalasville Road and Ohio Street, including the Martinsville industrial park, the John Walton Ford car dealership and 84 Lumber.
- **SR 39 Corridor** – Located on the west side of Martinsville along SR 39 from the SR 39/SR 37 split southward to just south of Morgan Street northward. Pending annexation approval, the Redevelopment Commission would extend the SR 39 Corridor TIF District southward to include the area south of Indian Creek.

The Martinsville Common Council voted August 6, 2012 to approve the annexation to add 7.8 square miles to the city increasing its size to about 12.4 square miles. At the time of the FEIS preparation, the annexation was being challenged in court and had not been implemented.

Within three years after annexation, the city must provide water and sewer services to existing residences and businesses. Although the Legendary Hills neighborhood is no longer included within the annexation boundaries, a water service main line has been provided to this neighborhood. In addition, a regional sanitary lift station, interceptor sewer, well field, and water treatment plant are planned south of Indian Creek. The lift station would be constructed on the east side of SR 37 near Buckner Branch and the interceptor sewer generally would follow along the north side of Buckner Branch. This station and sewer would serve between 2,000 to



3,000 households by late 2014. The south well field and water treatment plant would be constructed just south of Legendary Hills on the west side of SR 37.

5. Characterize the resources, ecosystems, and human communities of concern and explain how they have historically changed.

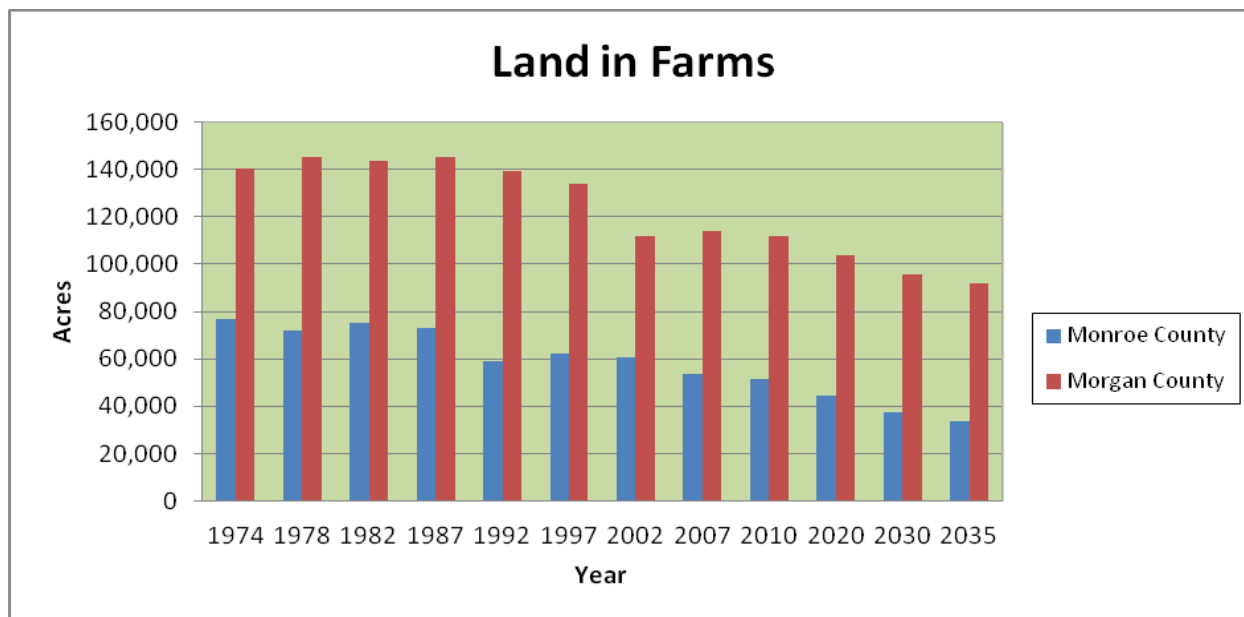
Based on coordination with resource agencies, the resources potentially affected in Section 5 are farmland, forest, streams, wetlands, and karst. Baseline reports for each resource were evaluated to analyze the quantitative historic changes for each resource in the two counties of the I-69 Section 5 study corridor. (Refer to the discussion of these specific resources in **Chapter 4, Affected Environment**, and **Chapter 5, Environmental Consequences**, for their respective baseline data sources.) Data to create a baseline analysis was unavailable at the TAZ level. The best available data was the county level, thereby covering the geographic scope for Section 5. The following data give an overall view of the historic trends for farmland, forests, wetlands, and streams for each county, which does not include changes from the direct or indirect impacts of I-69. Future trends for these resources are discussed in *Step 7*.

Farmland—This cumulative effects analysis focuses on the direct, indirect, and other changes in agricultural land resulting from road construction. Past trends in agricultural land in farms and future projections were evaluated to analyze these changes. **Figure 5.24-2** shows the acres of agricultural land in farms in Monroe and Morgan counties from 1974 to present, and a straight-line projection (i.e., a linear regression analysis) of acres of land in farms to the year 2035.

Between 1974 and 2007 in Monroe County, the acres of land in farms decreased by 23,143 acres, or 30% (from 76,681 to 53,538 acres). The forecast for Monroe County projects the acres of land in farms to continue to decrease from 53,538 acres in 2007 to 33,902 acres in 2035, a loss of approximately 19,636 acres or an additional 37%.⁵ The data indicates that from 1974 to 2007, Morgan County experienced a 19% reduction in farmland acreage. The forecast for Morgan County projects the acres of land in farms to continue to decrease from 114,136 in 2007 to 91,760 by 2035, a loss of an additional 20%. These data and straight-line projection forecasts give an overall view of the baseline trends and projections of farmland for each county. They do not include changes resulting from the direct or indirect impacts of I-69 or changes from other future activities. A survey of land in farms in 2007, by the United States Agricultural Census, identified a total of 167,674 acres of agricultural lands in the two counties that represent the geographic scope in Section 5, as follows:

- Monroe County –53,538 acres
- Morgan County – 114,136 acres

⁵ Source: U.S. Agricultural Census 1974 through 2007: Michael Baker, Jr. Inc. straight-line projections for years 2010 through 2035.



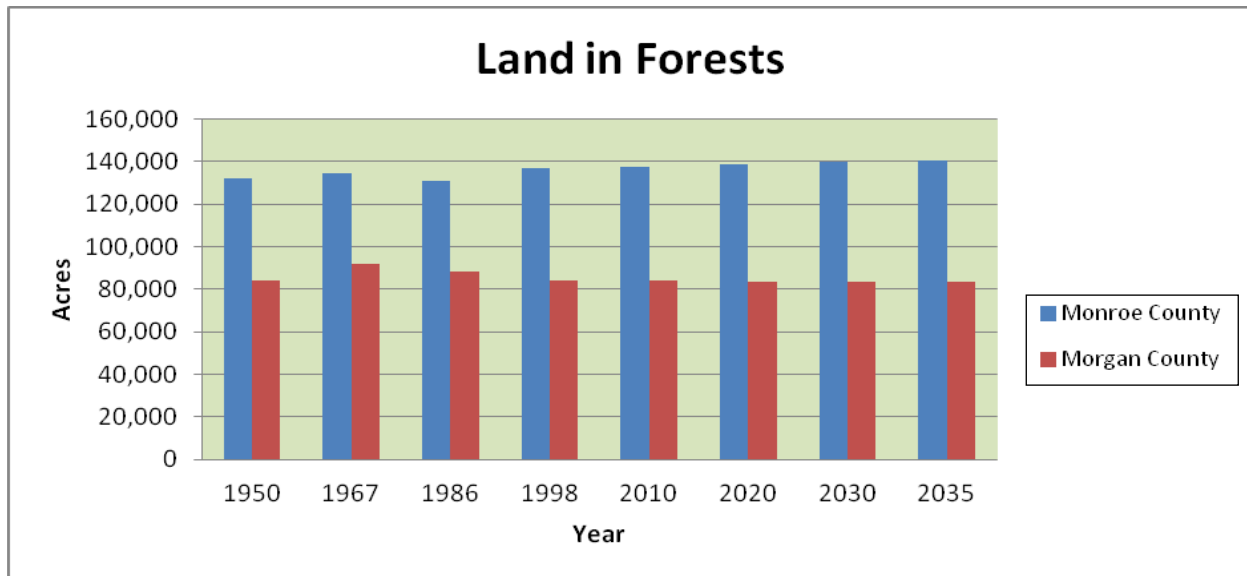
Source: U.S. Agricultural Census 1974 through 2007, Michael Baker, Jr. Inc. straight-line projections for years 2010 through 2035

Figure 5.24-2: Land in Farms—Monroe and Morgan Counties—History and Trends

Forests—Approximately 4.5 million acres, or 20%, of Indiana is forested. Most forests are located in the southern half of the state (Tormoehlen et al., 2000). As noted in the Tier 1 FEIS (Appendix G), almost 200 years ago, forests covered about 85% of Indiana's land area. As farming became a central part of Indiana's economy, forests began to be replaced by farmland. Estimates indicate that by the mid-1800s, Indiana had lost almost 50% of its forest land. However, as Tier 1 further states, in southwestern Indiana, 1950 to 1998 showed an increase in forests from 1,904,000 to 2,026,500 acres, an increase of 6.4% compared to previous years. During that same period, Monroe County experienced a 3.6% increase in forestland, and Morgan County experienced a slight decline of 0.1%. Changing land management practices are contributing to this trend of increased forestation as some cropland and pasture are allowed to revert to forest and existing narrow wooded strips are allowed to expand. However, the statewide and Morgan County estimate for the period from 1986 to 1998 also showed a slight decline in total acreage was common suggesting that increases in forest acreage within other counties may have reached a plateau. A survey of Indiana's forests, 1999-2003, published by the United States Department of Agriculture (USDA) Forest Service identified a total of 233,600 acres of forest in the two counties in the Section 5 Study Area, as follows:

- Monroe County – 142,600 acres
- Morgan County – 91,000 acres

Figure 5.24-3 shows the land in forest in Monroe and Morgan Counties from 1950 through 1998, and projected through 2035.⁶



Source: I-69 Tier 1 EIS, USDA Forest Service

Figure 5.24-3: Land in Forest—Monroe and Morgan Counties

As noted in the Tier 1 FEIS, future trends of forests in the Section 5 Study Area are anticipated to be similar to that of the State of Indiana, i.e., it is expected forests will show evidence of an achieved balance with little change in the actual amount of forestland.

Wetlands—USFWS estimates that between 1780 and 1950 Indiana lost millions of acres of wetlands (see the Tier 1 FEIS Appendix H). Current wetland figures show 813,000 acres remaining by the mid-1980s, according to the most recent and complete analysis by the Department of Natural Resources in 1991. The Indiana Wetlands Conservation Plan states that with the majority of wetland resources having been lost or converted, all remaining wetlands are important and should be considered important for conservation (IDNR, 1996). The stresses on wetlands include impacts to water quality, alterations of water levels, and other surface disturbances. As a result, the biological diversity of Indiana’s natural wetlands has been degraded. Of all wetland types, the palustrine forested (PFO) wetlands (bottomland hardwoods) have been identified in Indiana as the state wetland priority type (IDNR, 1988). The Tier 1 FEIS (Appendix H) identified a total of 11,155 acres in wetlands for Monroe and Morgan counties:

- Monroe County – 3,323 acres
- Morgan County – 7,832 acres

⁶ Sources: 1950 to 1998 I-69 Tier 1 EIS, USDA Forest Service; Michael Baker, Jr., Inc. straight-line projections for years 2010 through 2035.



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These acreages are expected to be similar today since very little development has occurred in these counties, and coordination with local resource agency officials appears to indicate wetland acres may be increasing in recent years. The location of I-69 in these counties is generally urban and rural, and wetlands are in floodplains for the most part. State and federal regulations today along with the Nation’s policy and IDNR’s goal of “No Net Loss” for wetlands have curbed their loss and with programs such as the Wetland Reserve Program,⁷ acreages are expected to increase.

An INWRAP evaluation of wetlands within the right-of-way of Section 5 alternatives is included in **Appendix F**, *Final Wetland Technical Report*. There is no county-by-county level information that will allow forecasting future wetland trends. Current mitigation measures generally require between a 2 to 1 and a 4 to 1 replacement for any wetland loss, depending upon the quality of the wetland impacted. These measures both reduce the amount of existing wetland being drained and increase the overall wetland acreage for the area.

Streams—The Upper White River watershed, Lower White River watershed, and Lower East Fork White River watershed are the three major watersheds traversed by the project corridor. Information regarding water quality in the three major watersheds and their sub-watersheds within the project corridor is summarized as follows.

Upper White River Watershed

Numerous streams identified in the project corridor are within the Upper White River watershed. These streams are tributaries to the White River, which drains to the Wabash River. Several streams in the watershed are included in the State of Indiana’s Draft 2012 Clean Water Act (CWA) Section 303(d) list of impaired waterbodies (IDEM 2012), including White River itself and Indian Creek. However, none of the alternatives cross either of these impaired watercourses. The White River is listed as impaired due to its impaired biotic communities, Fish Consumption Advisory (FCA) for Mercury, and FCA for polychlorinated biphenyl (PCBs). Indian Creek is listed with unacceptable levels of *E. coli*. **Section 5.19.2.3, Analysis (Table 5.19-8)**, identifies major streams, and tributaries within the right-of-way of each alternative.

- **Indian Creek-Sand Creek Watershed:** This sub-watershed encompasses approximately 7,835 acres, and it includes approximately 3,200 feet of the northernmost portion of the Section 5 corridor. There are no National Pollutant Discharge System (NPDES) discharge points in this sub-watershed.
- **Little Indian Creek-Jordan Creek Watershed:** This sub-watershed encompasses approximately 10,896 acres, and it is located from Maxwell Hill south to Pine Boulevard (east of SR 37). There are no NPDES discharge points in this sub-watershed.

⁷ The Wetland Reserve Program is administered by the USDA Natural Resources Conservation Service (NRCS) as a voluntary program offering landowners the opportunity to protect, restore, and enhance wetlands on their property. The NRCS provides technical and financial support for these programs.



- Bryant Creek Watershed: This sub-watershed encompasses approximately 7,277 acres, and it is located from Pine Boulevard (east of SR 37) south to West Burma Road (west of SR 37). There are no NPDES discharge points in this sub-watershed.

Lower White River Watershed

Numerous streams identified in the project corridor are within the Lower White River watershed. These streams are tributaries to the White River, which drains to the Wabash River. Several streams in the watershed are included in the State of Indiana's Draft 2012 CWA Section 303(d) list of impaired waterbodies (IDEM 2012), including the White River itself and Beanblossom Creek. None of the alternatives cross the White River. However, all of the alternatives cross Beanblossom Creek, which is listed as impaired with high levels of PCBs.

Section 5 of the I-69 corridor crosses four sub-watersheds of the Lower White River watershed. The four sub-watersheds are briefly described below (IGS GIS Atlas, 2012).

- Beanblossom Creek-Indian Creek Watershed: This sub-watershed encompasses approximately 11,673 acres, and it covers a small portion in the middle of the Section 5 corridor. There are no NPDES discharge points in this sub-watershed.
- Beanblossom Creek-Buck Creek/Muddy Fork Watershed: This sub-watershed encompasses approximately 12,115 acres, and it covers the middle portion of the Section 5 corridor. There are no NPDES discharge points in this sub-watershed.
- Beanblossom Creek-Stout Creek Watershed: This sub-watershed encompasses approximately 15,518 acres, and it covers the middle portion of the Section 5 corridor. There are three NPDES discharge points in this watershed. Only one is located upstream of the corridor and it is identified as the ABB Power T & D Company (formally Westinghouse). This outfall is in the headwaters of an unnamed tributary to Stout Creek of the Beanblossom watershed. However, none of the alternatives directly cross Stout Creek. There are two other NPDES discharges that are located well downstream and west of the project corridor. They include the Star of Indiana (old Brown School Waste Water Treatment Plant) facility and the Bloomington North (Blucher Poole) Sewage Treatment Plant.
- Griffy Creek Watershed: This sub-watershed encompasses approximately 9,027 acres, and it extends from Beanblossom Creek south to North Kinser Pike Road. There are no NPDES discharge points in this sub-watershed.

Lower East Fork White River Watershed

Numerous streams identified in the project corridor are within the Lower East Fork White River Watershed. These streams are tributaries to the Lower East Fork White River which originates from the confluence of the Upper East Fork White River and Muscatatuck River near Medora then flows southwest before joining the Lower White River near Petersburg and ultimately discharging into the Wabash River. Several streams in the watershed are on the State of Indiana's Draft 2012 CWA Section 303(d) list of impaired waterbodies (IDEM 2012), including

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the Lower East Fork White River itself and Clear Creek, as well as Weimer Lake. Only Weimer Lake is within the Section 5 corridor and it is not directly crossed by any alternative. Alternatives 7 and Refined Preferred Alternative 8 extend an existing pipe culvert along an inlet to Weimer Lake. Weimer Lake is listed due to its impaired biotic communities and FCA for mercury. Several tributaries to the Lower East Fork White River and Clear Creek are in the Section 5 corridor.

Section 5 of the I-69 corridor crosses two sub-watersheds of the Lower East Fork White River watershed. The two sub-watersheds are briefly described below (IGS GIS Atlas, 2012).

- Clear Creek-May Creek Watershed: This sub-watershed encompasses approximately 19,182 acres, and it covers the southern terminus of the Section 5 corridor. There is one NPDES discharge facility in the watershed. It is identified as the Dillman Road Waste Water Treatment Plant that discharges into Clear Creek. This is located well south and downstream of the corridor.
- Clear Creek-Jackson Creek Watershed: This sub-watershed encompasses approximately 16,074 acres, and it covers the southern portion of the Section 5 corridor. There is one NPDES discharge point in the watershed located at Keil Brothers Oil Company Service Station for groundwater treatment. This point source discharges into a tributary to Jackson Creek that feeds Clear Creek, located east and downstream of the corridor.

IGS GIS Atlas stream data shapefiles were used to estimate the total length of streams within the two-county area. There are approximately 1,835 miles (9,688,056 linear feet) of streams within the two counties, distributed as follows:

- Monroe County – 903 miles (4,766,934 linear feet)
- Morgan County – 932 miles (4,921,122 linear feet)

Karst—Karst features within Indiana are most prevalent from the area just north of Greencastle (in West Central Indiana) extending south to the Ohio River just west of New Albany. Within the Section 5 corridor, karst features occur in the 12.1 mile section south of Chambers Pike. The area between Chambers Pike to the northern terminus has been determined not to be karst terrain. (see **Section 5.21**, *Karst Impacts*, **Figure 5.21-3**).

Karst ecosystems are an important feature of Southern Indiana. Karst forms as water dissolves bedrock. Water resources in karst areas are especially sensitive to impairment as very little water purification occurs in karst areas because the water flows directly through cracks and fissures in rocks rather than percolating slowly through soil as in other types of terrain. Therefore, water quality is an important concern in karst areas since karst flowpaths can convey pollutants to these water sources. While most of the Section 5 study area population utilize surface water sources for potable water (primarily Lake Monroe Reservoir), private groundwater wells are reported throughout the Section 5 karst study area.

Karst resources also are important because they provide habitat for a number of rare, threatened, and endangered species. Many species of bats including the federally-endangered Indiana bat



(*Myotis sodalis*) use caves which form in karst areas. Caves A and B and their associated conduits, groundwater systems, and recharge areas were surveyed because of their connection to SR 37 (see **Section 5.21.3.7, Potential Impacts upon Threatened and Endangered Species and Cave Biota**). Surveys concluded that no federally listed species were identified as part of the biological surveys. Five troglobitic species were identified in Cave B, two of which were State-listed Rare Species (cave crayfish [*Orconectes inermis testii*] and Barr's cave amphipod [*Crangonyx barri*]). A spring located downgradient of Cave B had no troglobitic species. Cave C (a tributary to Cave A) had one troglobitic species (cave dung fly [*spelobia tenebrarum*]) that was not designated rare or protected. Cave A had 11 troglobitic species, of which eight were globally rare, two were State-listed Rare Species (Barr's cave amphipod [*Crangonyx barri*] and cave crayfish [*Orconectes inermis testii*]), four species were on the State Watch List (Barr's cave crayfish ostracod [*Sagittocythere barri*], Packard's groundwater amphipod [*Crangonyx packardi*], Bollman's cave millipede [*Conotyla bollmani*], and Indiana cave springtail [*Sinella alata*]), and two were State-listed Endangered Species (hidden spring snail [*Fontigens cryptica*] and Mayfield cave beetle [*Pseudanophthalmus shilohensis mayfieldensis*]). A detailed description of the survey methodologies and results of this study can be found in the unpublished *Cave Fauna of the Section 5 Corridor of I-69* (Lewis, 2005), provided as part of **Appendix Y, Final Karst Report (Redacted)**.

Karst resources in the Section 5 Study Area historically have been impacted to a limited extent by agriculture, residential and commercial development, limestone quarrying, and logging. The Monroe Hospital complex, Medical Park Boulevard, parking lots, electrical sub-station, and two retention basins were constructed on the southwest corner of the Fullerton Pike/SR 37 intersection. Additional medical or commercial development buildings and related, parking lots, new access roads, onsite stormwater management, and a helipad are also planned. Portions of this complex and most of the planned development is within the Cave A recharge area (see **Section 5.21, Karst Impacts, Figure 5.21-6**).

The avoidance and minimization of impacts to karst features has been an environmental concern for the INDOT and the FHWA since studies in the early 1990s. INDOT developed a karst report as part of the Southwest Indiana Highway Study entitled "Karst Features in the Bloomington to Evansville Highway" as early as 1994. This study was published as Appendix G in the March, 1996 Draft Environmental Impact Statement (DEIS) for the Southwest Indiana Highway. The study area for this report extended from SR 37 south of Bloomington in Monroe County to SR 57 near the town of Newberry in Greene County, Indiana, a distance of approximately 32 miles.

To define guidelines for the development of transportation projects in karst areas and minimize the impact of construction projects, INDOT, IDEM, IDNR, and the USFWS entered into the Karst MOU in 1993. Monroe County adopted a zoning ordinance (Chapter 829 of the Monroe County Zoning Ordinance and 20.05.042 Environmental Standards; Karst Geology of the City of Bloomington Unified Development Ordinance) to protect karst features within that county and the Monroe County Comprehensive Plan (2012) identifies strategies to maintain and enhance the integrity of the County's natural features including karst features. These strategies include excluding karst features, floodway, and slopes greater than 15% from the acreage used to calculate subdivision density in urban areas and increasing sanctions for violations of protected

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slopes, karst features, and floodways. It should be noted that for this project, FHWA and INDOT invited the USEPA to participate in the karst study and assessment.

The karst landscape is continually evolving. Karst features can change rapidly with subsequent opening and infilling of sinkholes, caves, and swallets as well as increase and decrease in spring discharges. Impervious surfaces, such as roads, alter the natural patterns of runoff and infiltration and can also be a source of pollution entering karst systems. Private and water utility wells located within the karst zones of susceptibility could be impacted by changes in surface runoff to karst features resulting from road construction and the effects of induced growth. **Table 5.24-6** shows the types and quantities of karst features identified within the Section 5 Karst Study Area.

Table 5.24-6: Karst Features Identified Within Karst Study Area*					
Karst Feature Type	Quantity/ Number	Within Section 5 Corridor*	Relevant Karst **Outside of Section 5 Corridor	Total	Karst Features within Existing SR 37
Cave Recharge Area	No. of Features	1	1	2	1
	Area (acres)	94.5	65.8	160.3	22.5
Sinking Stream Watersheds	No. of Features	5	4	9	5
	Area (acres)	776.1	1,053.8	1,829.9	219.2
Springs	No. of Features	80	74	154	4
Sinkhole Drainage***	No. of Features	214	267	481	54
	Area (acres)	440.7	537.6	978.3	50.7
Buried Sinks	No. of Features	19	7	26	13
	Area (acres)	65.9	11.9	77.8	21.4
Totals:	No. of Features	319	353	672	77
	Karst Features Area (acres)†	1,146.6	1,493.6	2,640.2	260.7
Relevant Karst Area*** (acres)		2,423.3	5,057.6	7,480.9	526.5
<p>* The Karst Study Area consists of the Section 5 corridor as well as area outside the corridor that is hydrologically linked to the corridor.</p> <p>** The relevant karst is the portion of karst within the I-69 Section 5 corridor and associated areas outside of the corridor; that has been demonstrated to have corridor-derived water passing through it; or is linked by logical inference based on the best available geographic, geologic, and hydrologic data, including the Tier 2 investigation.</p> <p>*** Additional smaller sinks (both observed and without surface expression during field checks) may be located within larger sinkhole drainages; these are not included in the total number of features or acreages. Karst features impacts <0.1 acres were rounded up to 0.1 acres, while the total karst feature impacts did not include this rounding.</p> <p>† The total karst features area excludes acreage from overlapping features, i.e., it is not a sum of the individual feature acreages rows listed above.</p>					



6. Characterize the stresses affecting these resources, ecosystems, and human communities and their relation to regulatory thresholds.

Farmland—The conversion of agricultural land to urban development has been the result of several demographic trends including more single person households, smaller households, bigger commercial facilities and larger, single level industrial plants. In light of this trend, the Natural Resources Conservation Service (NRCS) Farm and Ranch Lands Protection Program (FRPP) works cooperatively with State, Tribal, and local government entities and non-governmental organizations to help them preserve valuable farmland for future generations; protecting agricultural land use and related conservation values of the land.⁸

Forest—Over the past 50 years forests have been increasing in Indiana. Changing land management practices are contributing to this trend of increased forestation as some cropland and pasture are allowed to revert to forest and existing narrow wooded strips are allowed to expand. The increase in forests due to these changing practices has been greater than losses from the conversion of forests to agriculture, urban/suburban expansion, and other uses in the past 50 years. Development pressures stress forests; the fragmentation of forest areas also adversely affects wildlife. Fragmentation of forests may affect core forest habitat, which in turn may adversely affect a variety of species living in this core habitat. Wildlife dependent upon this habitat will be affected if these forests decline or continue to become fragmented. The goal of the USDA Forest Service is to continue the conservation programs and protect the forests. In the two-county geographic scope, agriculture and commercial and residential development have been and continue to be the principal stressors of this resource.

Wetlands—In the two-county geographic scope, agriculture and to a lesser extent residential and commercial development have been and continue to be the principal stressors of this resource. This includes the use of fertilizers, insecticides and pesticides, and the presence of contaminated runoff from agricultural operations, all of which contribute to water quality impacts. Also, in Monroe County along the SR 37 corridor south of the City of Bloomington, urbanization has been extending southward from Bloomington, further stressing this resource.

Streams—Within the corridor, portions of Griffy Creek, Beanblossom Creek, Little Indian Creek, Indian Creek and more recently Jordan Creek and Buckner Branch have been channelized and/or artificially drained. Stream channelization increases soil erosion, turbidity (with siltation), water temperature, risks to public health, and degradation to habitat and water quality. Additional stresses on these waterways, as well as on others in the corridor, include sewage (particularly in locations where septic systems operate poorly or are not maintained properly), agricultural run-off, contaminated road salt in surface water runoff from roadways/parking areas, and other industrial practices such as limestone quarry activities.

Karst—Within the Section 5 geographic scope, residential and commercial development and associated septic systems, agriculture, logging, and limestone quarrying have been and will

⁸ USDA, “Farm and Ranch Lands Protection Program,” NRCS, <http://www.in.nrcs.usda.gov/programs/FRPP/FRPPhomepage.html>.

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continue to be the principal stressors of karst resources. The use of fertilizers, insecticides and pesticides, contaminated runoff from agricultural operations and septic systems all contribute to karst water quality impacts. In addition, continued development in Monroe and Morgan counties changes infiltration and runoff patterns, which can affect karst flowpaths and potential contaminant introduction to karst resources and private groundwater wells. For example, the Monroe Hospital complex, Medical Park Boulevard, parking lots, electrical sub-station, and two retention basins were constructed on the southwest corner of the Fullerton Pike/SR 37 intersection. Additional medical or commercial development buildings and related parking lots, new access roads, onsite stormwater management, and a helipad are also planned. Portions of this complex and most of the planned development is within the Cave A recharge area (see **Section 5.21, Karst Impacts, Figure 5.21-6**).

7. Define a baseline condition for the resources, ecosystems, and human communities.

Farmland—The future trend for agricultural land in the two county geographic scope is continued loss of land in farms. A linear regression analysis for land in farms in the study area from 1974 to 2007 shows a downward trend (see **Figure 5.24-2**). At this rate, the land in farms in Monroe and Morgan counties would be approximately 126,000 acres by 2035 representing a projected loss of approximately 25% of the total agricultural land from the year 2007. In terms of a loss per year of agricultural land, this decline is approximately 1,547 acres per year in the two counties.

Forest—The future trend for forests in Monroe and Morgan counties seems to indicate that the increase in forest acres in recent decades has begun to plateau. That trend is expected to continue with little increase in forest acres anticipated for the foreseeable future (see **Figure 5.24-3**). A survey of Indiana's forests, 1999-2003, published by the USDA Forest Service, identified a total of 233,600 acres of forest in the two-county area with 142,600 acres in Monroe County and 91,000 acres in Morgan County.

Wetlands—**Appendix F, Final Wetland Technical Report**, contains detailed INWRAP data on 33 of the wetland complexes (these 33 wetland complexes contain 49 wetland units) that would be impacted by the alternatives, including a description of each wetland and its rating (“poor,” “fair,” or “good”) for quality of animal habitat, botanical measures, and hydrology. No quality assessments were completed on the 10 wetland complexes consisting entirely of open water ponds. **Section 5.19, Water Resources, (Table 5.19-6)** illustrates the general quality of each wetland or wetland complex and provides a comparison of wetlands affected by each proposed alternative. In summary, the INWRAP evaluation of each of the 33 non-PUB wetland complexes (49 units) potentially impacted by the project yielded the following ratings for animal habitat, botanical measures and hydrology:

Animal habitat:	23 are “poor”	14 are “fair”	12 are “good”
Botanical:	36 are “poor”	13 are “fair”	0 are “good”
Hydrology:	1 is “poor”	23 are “fair”	25 are “good”



The general quality of the wetlands impacted by alternatives is fair to poor. The majority of the wetlands show poor to fair quality in their regard to animal habitat; poor to fair in botanical quality; and, fair to good quality in their hydrology measure.

Streams—The Qualitative Habitat Evaluation Index (QHEI) and Headwater Habitat Evaluation Index (HHEI) have been completed on all streams within the project corridor, as appropriate. The QHEI/HHEI data and maps are provided in **Appendix M, *Final Stream Assessment Report***. A total of 370 stream segments (excluding culverted/piped portions) were identified within the six alternatives studied throughout Section 5 corridor and an assessment was completed for each segment. If the habitat along the length of the stream changed, a separate assessment was made. As the QHEI/HHEI scores indicate, approximately one-third (29.5%) of streams crossed by the alternatives have at least moderate water quality. Only one of the 29 crossing locations using QHEI to score fell into the highest quality category. About 6% of the HHEI scores (19 of the 341 crossing locations) fell into the highest quality categories.

Intermittent stream segments evaluated using HHEI include tributaries of Clear Creek, Stout Creek, Beanblossom Creek, Fox Hollow of the Beanblossom watershed, Little Indian Creek, Bryant Creek, and Indian Creek. Ephemeral stream segments include tributaries of Clear Creek, Stout Creek, Griffy Creek, Beanblossom Creek, Fox Hollow and Payne Hollow of the Beanblossom watershed, Bryant Creek, Little Indian Creek, and Indian Creek.

All of the perennial streams met the criteria for evaluation using QHEI protocol. Griffy Creek (S5-s065a_1 and S5-s065a_3, S5-s065b, S5-s065c, and S5-s065d); Beanblossom Creek (S5-s081a through S5-s081h); Bryant Creek (S5-s288a through S5-s288c); Little Indian Creek (S5-s345c through S5-s345h); and Jordan Creek (S5-s350a through S5-s350d) are the perennial streams in the Section 5 corridor identified as being potentially impacted by the alternatives. These perennial streams are located throughout the Section 5 corridor. Buckner Branch (i.e., S5-s351a and S5-s351c) and an unnamed tributary to Bryant Creek (i.e., S5-s253e), designated as intermittent streams on USGS mapping, were also assessed using the QHEI methodology.

Eighteen of the 29 segments assessed using the QHEI method scored less than 51, indicating that the stream may be non-supportive of its aquatic life use designation. These segments include one or more portions of Griffy Creek, Beanblossom Creek, Little Indian Creek, and all of Jordan Creek and Buckner Branch.

The QHEI scores at the crossings of one or more portions of Griffy Creek, Beanblossom Creek, unnamed tributary to Bryant Creek, Bryant Creek, and Little Indian Creek range from 51 to 64, indicating that these 11 stream segments are only partially supportive of their aquatic life use designations.

The QHEI score at the segment of Bryant Creek (S5-s288a), from north of Bryant's Creek Road to SR 37 received a score of 66.5. Based on IDEM criteria, a score over 64 indicates a stream may be capable of supporting a balanced warm water community.

Karst—The Section 5 survey of karst features for the corridor and adjacent areas known and/or inferred to be linked through groundwater flowpaths or surface flow areas identified a total of 672 karst features (see **Section 5.21, *Karst Impacts*, Table 5.21-1**). This survey documents

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reviews of karst information relevant to the Section 5 corridor, field checks of previously recorded karst features, field investigations to identify previously unrecorded karst features, water chemistry analysis, dye tracing of karst features, and recommendations for karst feature avoidance, impact minimization, and mitigation of unavoidable impacts. The general locations of the identified karst features relative to the Section 5 corridor are depicted in **Figures 5.21-3** and **5.21-4**. The six alternatives are located within karst terrain exhibiting dense concentrations of karst features distributed across the Section 5 corridor.

Karst terrain within the Section 5 corridor occurs south of Chambers Pike. Relevant karst is the portion of karst (12.1 miles) along the Section 5 corridor, and associated areas outside of the corridor demonstrated to have corridor derived water passing through it; or is linked by logical inference based on the best available geographic, geologic, and hydrologic data, including the Tier 2 investigation. It does not include areas outside the corridor that contribute water to the corridor. Three distinct areas (hydrogeologic units) of relevant karst geology were identified within the study area in Monroe County. Bloomington Karst begins at the southern terminus at approximately That Road (just north of the Section 5 SR 37 interchange) and continues north to approximately Arlington Road (old SR 46) within the Mitchell Plateau Physiographic Region. The Bloomington North Relevant Karst begins at approximately Arlington Road and continues to Kinser Pike at the southern slope of the Beanblossom Valley within the Mitchell Plateau Physiographic Region. The Simpson Chapel Relevant Karst begins approximately at Wayport Road at the northern slope of the Beanblossom Valley and continues north to just south of Chambers Pike within the Norman Upland physiography. These features are discussed in **Section 5.21**, *Karst Impacts*, and shown in detail on **Figures 5.21-3** and **5.21-4**.

Groundwater and surface water are both used as potable water sources in the Section 5 Study Area. Groundwater wells are used abundantly throughout Section 5, and springs are also used as a potable water supply for individual landowners. The spring discharge within the Study Area varies greatly, due to the hydrogeologic nature of the spring and flow conditions. Spring discharge could potentially be altered by changes in flowpaths resulting from highway construction. Tools including a karst ordinance are in place in Monroe County to control development through karst and sinkhole development standards, land use planning, and subdivision and zoning regulations.

The NRCS sewage disposal septic tank absorption field rating classes identified for the Section 5 project area include somewhat limited, not rated, and very limited soils. A soil septic absorption map showing soil/septic system suitability for Monroe and Morgan Counties is included as **Figures 5.24-5 A-C**. Soil associations and shallow bedrock present within the Section 5 project vicinity are described in **Section 4.3**, *Natural Environment*. Environmentally sensitive areas and karst feature densities in Monroe and Morgan Counties are shown in relation to the TAZs with anticipated induced growth from I-69 on **Figures 5.24-6 A-C**. The City of Bloomington Utilities Department is responsible for treatment and distribution of water, collection and treatment of wastewater, and channeling of stormwater in the City of Bloomington. **Figures 5.24-7 A-C** show the extent of City of Bloomington wastewater infrastructure and karst features.



8. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities.

The five major resources considered in this cumulative effects analysis are farmland, forest, wetlands, streams, and karst. The most common cause-and-effect issue is conversion of agricultural land, forests, and wetlands to other uses, (primarily residential and commercial development). Urbanization is occurring in Monroe County due to the presence of the City of Bloomington. While urbanization is occurring along the SR 37 corridor north of Section 5, in accordance with land use plans in place in Monroe County, residential development and to a lesser extent commercial development and limestone quarries are the primary human activities that affect resources. Tools including a karst ordinance are in place in Monroe County to control development through karst and sinkhole development standards, land use planning, and subdivision and zoning regulations.

The following plans, some of which were developed in full or in part, as a result of the I-69 Planning Grant Program are applicable to the two county Indirect Impact Study Area. These plans identify sensitive environmental areas and recommend further measures including zoning ordinances to protect karst features, water quality, ecosystems, and natural resources.

- *Monroe County Comprehensive Plan* (2012)
- *Monroe County State Route 37 Corridor Plan* (2010)
- *Morgan County Comprehensive Plan* (2010)
- *Morgan County SR-37 / SR-144 Corridor Plan* (2010)
- *Martinsville Comprehensive Plan* (2010)
- *Mooreville Comprehensive Plan* (2003)

Farming practices can adversely affect the ecosystem in certain situations: land clearing can fragment or denude forested land; tilling can lead to erosion and stream sedimentation; artificially draining wetlands and redirecting flow to another watershed with subsurface tiling, stormwater and irrigation runoff can deposit fertilizers, herbicides, and insecticides into streams and aquifers, thereby affecting water quality; etc. Regarding conversion of forest and agricultural land for limestone quarry operations, there are no regulations requiring the reclamation of limestone quarry lands; therefore, no assumption is made that these lands would be restored to forest or agricultural use.

9. Determine the magnitude and significance of cumulative effects by identifying the changes in Section 5 as a result of I-69.

The cumulative changes (direct, indirect and other) in Section 5 as a result of I-69 for each of the five identified resources are as follows:

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Farmland—A survey of agricultural lands in 2007, by the U.S. Agricultural Census, identified a total of 167,674 acres of agricultural lands in the two counties in the Section 5 geographic scope.

- *Direct:* The direct conversion of agricultural land to highway right-of-way would range from an estimated 62 acres for Refined Preferred Alternative 8 to 162 acres for Alternative 5. Section 5's mainline does not bisect existing agricultural parcels due to the use of existing SR 37. Impacts include removal of agricultural land from production for right-of-way and the creation of uneconomic remnants and/or parcels landlocked as a result of loss of access. The number of agricultural parcels remaining after severance ranges from 57 to 109, the majority of which will be less than 5 acres in size. During the parcel impact analysis process, uneconomic remnants were considered and categorized as potential full parcel acquisitions assuming those parcels would lose all utility. However, it is unlikely that all of these parcels would have no productive use. In the case of landlocked parcels, many parcels that would have lost access as a result of the project will be provided new access via existing local roads or new access roads as features of the project. For one to three cases, depending on the alternative, providing access was not deemed reasonable from an economic standpoint. The disposition of landlocked parcels and uneconomic remnants will be addressed during final design.

Potential impacts to agricultural lands are summarized in **Section 5.3.3, Land Use and Zoning**, (**Table 5.3-1**) and impacts to farmland are addressed in detail in **Section 5.4, Farmland Impacts**. Mitigation measures for impacts to farmland are described in **Section 7.3.10, Farmland Impacts**.

- *Indirect:* Section 5 is more urbanized than Sections 1 through 4 and a portion of induced growth is anticipated to occur on parcels that are currently developed, resulting in increased densities. **Table 5.24-2** shows the acreage of projected induced growth that is expected to occur on developed land rather than agricultural or forest land. In these TAZs, the land is so attractive for future development that the No Build and/or Build growth (based upon the household or jobs development ratios) actually exceeds the amount of "available" agricultural and forest land. Examples of induced development resulting in greater densities includes a high-rise apartment building that would exceed the 4.82 households/acre value or when existing buildings would be replaced by larger or taller buildings (see **Appendix AA, Indirect Impact Analysis**).

Within each TAZ, the remaining induced growth converts agricultural land and forest to households and commercial developments. In Monroe County, an estimate of 35% of induced growth occurring on available agricultural land and 65% of the induced growth occurring on available forested land was established based on an analysis of specific land uses within the Section 5 project. In Morgan County, an estimate of 55% of induced growth occurring on available agricultural land and 45% of the induced growth occurring on available forested land was established based on an analysis of development of specific land uses within the Section 5 project.

A total of 32 to 37 acres of agricultural land are forecasted to be converted within Section 5 as a result of induced growth from I-69 (see **Table 5.24-2**). These indirect land use



changes vary slightly between the alternatives based on the locations of interchanges and the amount of available agricultural land within the induced growth TAZ. The location of interchanges is most closely related to the location of induced growth. The forecasted amount of traffic, which creates much of the economic demand for the amount of indirect land use changes, is different for each alternative based on the access provided. Combined, the interchange locations and traffic volumes generally affect the location and amount of indirect land use changes and as such would result in different growth patterns to occur.

The average number of housing units per acre in Monroe County is 4.82 units, while the average number of housing units per acre in Morgan County is 4.38 units per acre. The estimated number of households that would be established as a result of the I-69 project in Section 5 is 181 in Monroe County and 156 in Morgan County. By dividing the number of households by the average number of units per acre in each, it is estimated that the number of acres to be converted to residential use as a result of the project (i.e., indirectly affected) would be as follows: Monroe County, 37.4 acres (Alternative 4), 37.5 acres (Alternatives 5, 7, 8, and Refined Preferred Alternative 8), and 37.7 (Alternative 6); and Morgan County, 35.6 acres. The induced development due to additional acres of housing in Morgan County is the same for all alternatives but varies between individual TAZs based on access (see **Table 5.24-3**).

The average number of jobs per acre in Monroe County is 17.8, while the average number of jobs per acre in the Morgan County region is 14.6. The estimated number of jobs that would be induced as a result of the I-69 project is 186 in Monroe County and 164 in Morgan County. By dividing the number of induced jobs in Monroe County by the average of 17.8 jobs per acre, and 14.6 jobs per acre in Morgan County, it is estimated that the number of acres to be converted to employment-related uses would be as follows: Monroe County, 10.6 acres (Alternatives 4, 5, 7, 8, and Refined Preferred Alternative 8) and 10.5 acres (Alternative 6); and Morgan County, 11.2 acres (Alternative 4) and 11.4 acres (Alternatives 5, 6, 7, 8, and Refined Preferred Alternative 8). The employees-per-acre, per-employment-type data were developed from the Institute of Transportation Engineer's (ITE) Code per Trip Generation 6th Edition during Tier 1.

The total number of acres converted as a result of induced growth compared with the total number of acres in the TAZs where induced growth is predicted to occur is as follows:

Monroe County: 48 acres (ranging from 0.6% of the 7,629 acres in the TAZs in Alternative 4 to 1.1% of the 4,454 acres in the TAZs in Alternative 6) would be converted for the induced development of households and jobs in Monroe County as a result of Section 5. Depending on the alternative, it is estimated that 0 to 10 acres of this induced growth would result in increased densities on developed land. For Monroe County, assuming 35% of the anticipated 38 to 48 acres of induced growth caused by Section 5 would occur on available agricultural lands, the predicted impact to agricultural lands is 13 acres (Alternatives 4 and 6) to 17 acres (Alternatives 5, 7, 8, and Refined Preferred Alternative 8). For Monroe County, assuming the remaining 65% will occur on

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forest lands, the predicted impact to forest lands range from 25 acres (Alternatives 4 and 6), to 31 acres (Alternatives 5, 7, 8, and Refined Preferred Alternative 8).

Morgan County: 47 acres (ranging from 0.4% of the 10,549 acres in the TAZs in Alternatives 5, 6, 7, 8 and Refined Preferred Alternative 8 to 0.5% of the 9,557 acres in the TAZs in Alternative 4) would be converted for the induced development of households and jobs in Morgan County as a result of Section 5. Depending on the alternative, it is estimated that 11 to 13 acres of this induced growth would result in increased densities on developed land. For Morgan County, assuming 55% of the anticipated 34 to 36 acres of induced growth caused by Section 5 will occur on available agricultural lands, the predicted impact to agricultural lands is 19 acres for Alternative 4 to 20 acres for Alternatives 5, 6, 7, 8, and Refined Preferred Alternative 8. For Morgan County, assuming the remaining 45% will occur on forest lands, the predicted impact to forest lands range from 15 for Alternative 4 to 16 acres for Alternatives 5, 6, 7, 8, and Refined Preferred Alternative 8.

As noted in **Tables 5.24-7 A-F**, a range of 32 to 37 acres of induced growth in Monroe and Morgan counties will likely occur on agricultural land, with 37 acres projected for Refined Preferred Alternative 8. In addition, between 239 (Refined Preferred Alternative 8) and 472 acres (Alternative 4) of agricultural land is proposed for mitigation of direct impacts (for wetlands and reforestation of upland forests). The combined induced growth and mitigation would result in 276 to 504 acres of impacts to agricultural lands (for Refined Preferred Alternative 8 and Alternative 4, respectively)—about 0.2% to 0.3% of the two-county total land area of 167,674 acres. As **Figures 5.24-4 A-C** show, the majority of the predicted development would occur near the proposed Section 5 interchanges:

- Alternative 4: Fullerton Pike, SR 45/2nd Street, SR 48/3rd Street, SR 46, Sample Road, Kinser Pike, and Paragon Road/Pine Boulevard
- Alternatives 5, 7, 8, and Refined Preferred Alternative 8: Fullerton Pike, SR 45/2nd Street (including split with Tapp Road), SR 48/3rd Street, SR 46, Walnut Street, Sample Road, and Liberty Church Road
- Alternative 6: Fullerton Pike, SR 45/2nd Street, SR 48/3rd Street, SR 46, Sample Road, and Liberty Church Road

As indicated above, it is also anticipated that mitigation within the Section 5 geographic scope for direct impacts of the Section 5 project to forests and wetlands will require some further acquisition and conversion of agricultural land. INDOT and FHWA have voluntarily committed to mitigate impacts to upland forests at a 3 to 1 ratio averaged over the entire length of the I-69 corridor, which includes a 1 to 1 ratio of replacement plus a 2 to 1 ratio of forest preservation (see **Section 7.2, Major Mitigation Initiatives**). Actual ratios within each individual section may vary from the overall average. For purposes of this analysis, a 1 to 1 replacement of upland forest impacts will be assumed within the Section 5 geographic scope. (The 2 to 1 conservation of existing forest land will not require new conversion of any agricultural land.) Thus it is estimated that approximately



433 acres (Alternative 4), 396 acres (Alternative 5), 239 (Alternative 6), 233 (Alternative 7), 249 (Alternative 8), and 228 (Refined Preferred Alternative 8) of agricultural land would be converted for the Section 5 upland forest reforestation portion of the mitigation program.

Likewise there will be some conversion of agricultural land to provide for the mitigation of direct impacts to wetlands, including forested wetlands, within the Section 5 geographic scope. An MOU executed between INDOT, USFWS, and IDNR in 1991 (see **Appendix V**, *Wetlands Memorandum of Understanding*) established mitigation ratios for a variety of wetland types. Based on those ratios, it is estimated that approximately 39.11 acres (Alternative 4), 53.23 acres (Alternative 5), 35.96 acres (Alternative 6), 16.39 acres (Alternative 7), 32.83 acres (Alternative 8), and 10.61 acres (Refined Preferred Alternative 8) of agricultural land would be converted to wetlands as part of the wetland mitigation program within Section 5.

Total loss of agricultural land due to mitigation for forest and wetland losses would range from 239 to 472 acres. Total indirect impacts due to induced development would range from 32 to 37 acres. The Refined Preferred Alternative 8 would convert a total of 338 acres of agricultural lands based on 62 acres of direct impact, 37 acres of indirect impact, and 239 acres of mitigation for forests and wetlands.

- *Other*: Other developments are anticipated to convert agricultural land to developed land resulting from household and employment growth projected for the No Build scenario. An additional potential conversion of agricultural land is limestone quarrying, which is a prominent land use in Monroe County. Most impacts to agricultural land from limestone quarrying occur when the land surface is stripped (rather than mining occurring underground). Local officials and limestone quarrying companies have been contacted in an effort to identify plans for quarrying land in the Section 5 project area. No new limestone quarries have been proposed within the project corridor; however, the existing quarry and milling operations have noted that they would expand quarry operations should it become economically beneficial based on market rates. The potential contribution to cumulative impacts to agricultural land will be re-evaluated if any such quarry expansion is proposed during the development of this highway documentation process.

The portion of Section 4 of I-69 from Evansville to Indianapolis within Section 5's geographic scope will directly impact 209 acres of agricultural land. The portion of Section 6 of I-69 from Evansville-to-Indianapolis within Section 5's geographic scope is projected to directly impact 359 acres of agricultural land within the Section 5 study area. Please note, the geographic scopes of the cumulative impact analyses in adjacent sections will of necessity overlap. As a result, some actions will be counted as cumulative impacts in more than one Tier 2 EIS; thus, the cumulative impacts of the I-69 project as a whole cannot be calculated by "adding up" the cumulative impacts totals that are given in each Tier 2 EIS.

The population and employment forecasts form the baseline condition for land usage needed by the 2035 population (**Tables 5.24-3, 5.24-4, and 5.24-5**). The No Build

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population forecasts have been determined based on birth rate, death rate, in migration, and out migration, and are independent of the I-69 project. They are as follows:

Monroe County: New households by 2035: 18,740; employment: 27,862. These added households and jobs result in 5,453.25 acres of total impacts (or No Build unconstrained growth). An estimated 1,898 acres of this growth would result in increased densities on developed lands resulting in 3,555.25 acres. Impacts to agricultural land are estimated to be 1,244.34 acres (35% of 3,555.25 acres). According to the expert land use panel, this growth would occur in areas outside of the immediate Section 5 construction project area near proposed interchanges. As noted above, **Figure 5.24-1** shows, the majority of the predicted development in the 2035 No Build condition would occur near the interchanges and intersections along SR 37.

Morgan County: New households by 2035: 8,086; employment: 6,308. These additional households and jobs result in 2,278 acres of impacts. An estimated 205 acres of this growth would result in increased densities on developed lands resulting in 2,073.17 acres. Impacts to agricultural land within Morgan County are estimated to be 1,140.25 acres (55% of 2,073 acres). According to the expert land use panel, most of this growth would occur in areas outside of the Section 5 project area. Total impact to agricultural land from the projected No Build growth for both Monroe and Morgan counties is estimated to be 2,385 acres (rounded).

- *Summary:* Direct impacts to agricultural land will result from the acquisition of agricultural lands for right-of-way needed for construction of I-69. Direct impacts to agricultural land in Section 5 range from an estimated 62 acres for Refined Preferred Alternative 8 to 162 acres for Alternative 5. Growth induced by the construction of Section 5 of I-69 is estimated to require the conversion of 32 to 37 additional acres of agricultural land within the two-county area. Indirect impacts to agricultural land will also include approximately 239 to 472 acres (for Refined Preferred Alternative 8 and Alternative 4, respectively) for mitigation of impacts to forests and wetlands.

Growth expected to occur within the two-county area even if I-69 is not constructed is estimated to require the conversion of 2,385 acres of agricultural land (35% in Monroe County and 55% in Morgan County of the 5,628 acre total No Build growth estimate). Other major projects that have been identified within the geographic scope of this analysis that will have a permanent effect on land use include Section 4 of I-69 in Monroe County, and Section 6 of I-69 in Morgan County. Direct impacts to agricultural land due to these other projects are estimated to be approximately 209, and 359 acres, respectively.

The combined total of direct, indirect, other impacts, and mitigation to agricultural land within the two-county area is estimated to range from 3,291 to 3,608 acres for Refined Preferred Alternative 8 and Alternative 4, respectively. The cumulative effects would thus convert approximately 2.0% to 2.2% of the total of 167,674 acres of agricultural land within the two-county area. Refined Preferred Alternative 8 would result in 62 acres (direct), 37 acres (indirect), 239 acres (mitigation for forests and wetlands), and 2,953



acres (other) for a total loss of 3,291 acres of agricultural land. **Tables 5.24-7 A-F** and **Tables 5.24-8 A-F** summarize the cumulative land use changes for agricultural land.

Forest—A survey of Indiana’s forests, 1999-2003, published by the USDA Forest Service identified a total of 233,600 acres of forest in the two counties in the Section 5 Study Area. Exact comparisons between the forest areas in the USDA survey and the forest areas identified during field surveys in Section 5 cannot be made due to the changing nature of the resource (e.g., some forested areas identified in the USDA survey may have been altered). However, generalizations can be made based on the available data.

- *Direct:* A direct impact for forests in the Section 5 Study Area would be the fragmentation of forested areas for right-of-way taking. Approximately 1,904 acres of forest are within the corridor, which is approximately 0.8% of the two-county total. Of the 1,867 total upland forest acres, from 228 acres (Refined Preferred Alternative 8) to 433 acres (Alternative 4) are within the right-of-way for this project. Refined Preferred Alternative 8 directly impacts 228 acres of upland forest. Although an exact comparison of USDA Forest Service and Section 5 forest survey data cannot be made, it is not likely there would be a notable difference in the percentages of impact.

Potential impacts to forests are addressed in detail in **Section 5.20, *Forest Impacts***. Upland forest impacts will be mitigated at a 3 to 1 ratio, including 1 to 1 replacement and 2 to 1 preservation for the I-69 Evansville to Indianapolis project as a whole; within individual sections these ratios may vary depending on the mitigation opportunities presented. Proposed mitigation within Section 5 will provide 228 to 433 new replacement acres of upland forest by converting agricultural land. Refined Preferred Alternative 8 will provide 228 acres of replacement upland forest. (Forested wetlands will be mitigated as wetlands, at a ratio of 3 to 1; however these are included in the wetlands totals to avoid double counting. The 228 to 433 acres (for Refined Preferred Alternative 8 and Alternative 4, respectively) of upland forest will be replaced by using 228 to 433 acres of agricultural land (see **Tables 5.24-7 A-F**). Mitigation measures for impacts to forests are described in **Section 7.3.11, *Forest Impacts***.

- *Indirect:* An indirect impact for forests would be the possibility of adjacent land taken for commercial or residential development, as a result of additional access provided by I-69. The Expert Land Use Panel identified the proposed new interchanges along I-69 as the probable locations of the 95 acres of new development that would occur as a result of the construction of I-69. Within the approximately 15,003 to 18,480 acres (total) of TAZs identified as potential locations for project-induced development, the 95 acres predicted to be developed as a result of the project are as follows: 22 acres are projected for job induced development in the two county study area and 73 acres of induced residential development are predicted to occur in the two county study area.

Timber harvest by landowners potentially affected by the Section 5 project may occur due to the potential of land being acquired for this project and uncertainty regarding the right-of-way acquisition limits and process. Salvage represents timber recovery as construction occurs and forested land is cleared to accommodate features of the project. Timber salvage, if determined feasible by the contractor, would occur during construction



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and would be conducted by the construction contractors. The amount of timber harvest by property owners is uncertain at this time, and no attempt has been made to quantify the impacts of these activities.

Section 5 is more urbanized than Sections 1 through 4 and a portion of induced growth (11 to 23 acres) is anticipated to occur on parcels that are currently developed, resulting in increased densities. Within each TAZ, the remaining induced growth on undeveloped land (72 to 84 acres in both counties) would convert agricultural land and forest to households and commercial developments. Within Section 5 it is estimated that 65% of the growth on undeveloped land in Monroe County will occur on forest land and 45% of induced growth on undeveloped land in Morgan County will occur on forest land.

In Monroe County, 35% of the anticipated 38 to 48 acres of induced growth would occur on available agricultural land resulting in the conversion of 13 to 17 acres and 65% of the induced growth would convert 25 acres of forest for Alternatives 4 and 6, and 31 acres of forest for Alternatives 5, 7, 8, and Refined Preferred Alternative 8. In Morgan County, 55% of 34 to 36 acres of induced growth would occur on available agricultural land resulting in the conversion of 19 to 20 acres and 45% of the induced growth would convert 15 acres of forest for Alternative 4 and 16 acres of forest for Alternatives 5, 6, 7, 8, and Refined Preferred Alternative 8. The total estimated indirect impact to forest for both counties is 40 acres for Alternative 4; 41 acres for Alternative 6; and 47 acres for Alternatives 5, 7, 8 and Refined Preferred Alternative 8.

- *Other:* The portion of Section 4 of I-69 from Evansville to Indianapolis within Section 5's geographic scope will directly impact 335 acres of forest. The portion of Section 6 of I-69 from Evansville-to-Indianapolis within Section 5's geographic scope will directly impact 209 acres. Please note, the geographic scopes of the cumulative impact analyses in adjacent sections will of necessity overlap. As a result, some actions will be counted as cumulative impacts in more than one Tier 2 EIS; thus, the cumulative impacts of the I-69 project as a whole cannot be calculated by "adding up" the cumulative impacts totals that are given in each Tier 2 EIS. No Build growth within the Section 5 project area is anticipated to impact about 3,244 acres of forest. This No Build growth would result from the conversion of 65% of 3,555 acres in Monroe County resulting in 2,311 acres of forest impact and 45% of 2,073 acres in Morgan County resulting in 933 acres of forest impact.

A potential major action identified as being independent of the I-69 project is limestone quarrying. While there are currently five active limestone quarries or milling operations within the Section 5 corridor area, there are no known quarry expansion plans for mining activity to in the foreseeable future. The current trend is the reopening of former limestone mining sites before mining of previously undisturbed land occurs. There are no reforestation requirements for any land converted to limestone quarry. In addition, there are no reclamation requirements to ensure that there will be no long term reductions in forested lands from ongoing major limestone quarry activities.



- *Summary:* Direct impacts on forests will result from the acquisition of forestland for additional right-of-way needed for road construction. The project will require the acquisition ranging from about 228 acres of upland forest for right-of-way under Refined Preferred Alternative 8 to 433 acres of upland forest required for right-of-way under Alternative 4.

Combined direct (228 to 433 acre reductions), indirect (40 to 47 acre reduction), and other (3,788 acre reduction) impacts reasonably foreseeable to occur total a cumulative conversion of 4,063 to 4,261 acres of forest to non-forest use. Potential cumulative conversion total includes measures proposed to mitigate direct impacts to forests due to the Section 5 project. There is proposed to be a total of approximately 228 to 433 acres of forest mitigation for the 1 to 1 replacement to offset the approximate 228 to 433 acres of direct impacts. Of this amount, all would be replacement (planted non-wetland bottomland forest), thereby resulting in no direct loss to forest. (Note: the impacts to forested wetlands would be mitigated using the appropriate wetland replacement ratio for “forested wetland” [i.e., 3 to 1 or 4 to 1] rather than “forest” [generally 1 to 1]). The Refined Preferred Alternative 8 would result in direct (228 acre reduction), indirect (47 acre reduction), and other (3,788 acre reduction). After accounting for the 228 acres of replacement forest from mitigation, the total cumulative conversion of forest acreage is a 3,835 acre loss for Refined Preferred Alternative 8 (see **Tables 5.24-7 A-F** and **Tables 5.24-9 A-F**). A survey of Indiana’s forests, 1999-2003, published by the USDA Forest Service identified a total of 233,600 acres of forest in the two counties (142,600 in Monroe County and 91,000 in Morgan County). Therefore, the cumulative impact of forest lost due to conversion is approximately 1.6% of the current amount of land in forest within these counties.

Wetlands—The Tier 1 FEIS (Appendix H) identified a total of 11,155 acres in wetlands for Monroe and Morgan counties. Field survey and delineation of wetlands conducted for Section 5 located approximately 107 wetlands for a total of 83.19 acres within the corridor, including 53.51 acres of Palustrine Emergent Wetland (PEM), Palustrine Forested Wetland (PFO), Palustrine Scrub-Shrub Wetland (PSS), and Palustrine Aquatic Bed (PAB) and approximately 29.68 acres of open water (Palustrine Unconsolidated Bottom Wetland (PUB)).

- *Direct:* The direct impacts for wetlands in Section 5 would be the taking of a wetland for right-of-way for an interchange or roadway construction. Impacts to wetlands, not including open waters, include 11.70 acres (Alternative 4), 16.06 acres (Alternative 5), 10.96 acres (Alternative 6), 5.18 acres (Alternative 7), 9.96 (Alternative 8), and 3.43 (Refined Preferred Alternative 8).

Surface water runoff of pollutants (including de-icing chemicals) and erosion and siltation from the roadway construction could also be considered as direct impacts to adjacent wetlands. The pollutant loadings in surface water runoff have been analyzed by the FHWA with the results showing that pollutant concentrations due to runoff from the highway are below the applicable EPA criteria. Permits required for construction of the interstate will include a detailed mitigation and monitoring plan for wetland and stream impacts.

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Section 5.23, *Permits*, provides more detailed information about permits that may be required. Best Management Practices (BMPs) will be used to prevent non-point source pollution, to control surface water runoff, and to minimize sediment damage to water quality and aquatic habitats. INDOT *Standard Specifications and Special Provisions* will govern construction activities to control erosion and subsequent water pollution. Consequently, it is expected that the project would have minimal impact as a result of runoff on wetlands and streams.

Potential impacts to wetlands are addressed in detail in **Section 5.19, *Water Resources***. The *Revised Tier 1 Conceptual Forest and Wetland Mitigation and Enhancement Plan* (in **Appendix S**) includes a commitment to replace wetlands at a ratio of 3 to 1 for forested and scrub/shrub wetlands, and a ratio of 2 to 1 for emergent wetlands. Mitigation for open water impacts are at a ratio of 1 to 1. The no net loss policy coupled with mitigation requirements have, based on coordination with local officials, actually increased the amount of wetlands in the area. Mitigation for wetland impacts in Section 5 could include approximately 39.11 acres (Alternative 4), 53.23 acres (Alternative 5), 35.96 acres (Alternative 6), 16.39 acres (Alternative 7), 32.83 acres (Alternative 8), and 10.61 (Refined Preferred Alternative 8). Mitigation for open water impacts in Section 5 could range from approximately 0.02 acres (Refined Preferred Alternative 8) to 5.38 acres (Alternative 6). Mitigation measures for impacts to wetlands are described in **Table 5.19-15** and **Table 5.19-16**, and in **Section 7.3.9, *Wetland Impacts***.

- *Indirect*: Anticipated indirect impacts for wetlands could be wetlands bought by a developer to build a service facility such as a gas station and/or convenience food mart at an interchange or a residential development. IDNR has stated a goal of “no net loss of wetlands,” which nearly eliminates the possibility of future indirect impacts from development of wetlands. Development near wetlands could result in impacts to wetlands due to pollutants (including de-icing chemicals) in runoff from impervious surfaces such as access roads and parking lots, and due to erosion and siltation from construction activities. However, with few exceptions (some of which are direct impacts of the Section 5 project), wetlands within Section 5’s geographic scope are not in the immediate vicinity of interchanges where most of the project-induced development is predicted to occur. No indirect acreage impacts to wetlands are anticipated due to the implementation of I-69 in Section 5.
- *Other*: Limestone quarry activities and other projected growth from the 2035 No Build condition are not expected to have direct impacts to wetlands due to current policies and regulations requiring mitigation of wetlands. Tier 2 I-69 Section 4 would potentially impact approximately 0.15 acres of wetlands (not including open water resources) in Section 5’s geographic scope. Tier 2 I-69 Section 6 would potentially impact approximately 3.80 acres of wetlands (not including open water resources) in Section 5’s geographic scope. Mitigation would be required for wetland impacts resulting from these projects. Please note, the geographic scopes of the cumulative impact analyses in adjacent sections will of necessity overlap. As a result, some actions will be counted as cumulative impacts in more than one Tier 2 EIS; thus, the cumulative impacts of the I-69



project as a whole cannot be calculated by “adding up” the cumulative impacts totals that are given in each Tier 2 EIS.

- *Summary:* Direct impacts to wetlands will result from the acquisition of wetland areas for additional right-of-way needed for road construction. Refined Preferred Alternative 8 will require the acquisition of about 3.43 acres of wetlands for right-of-way and a 3.95 acre reduction by other projects. In Refined Preferred Alternative 8 approximately 10.61 acres of wetland mitigation would result in the net gain of 3.23 acres of wetlands. Measures proposed to mitigate direct impacts to wetlands due to the Section 5 project would produce gains in wetland acreage in the two-county area. The Section 5 project proposes the development of wetland mitigation ranging from 10.61 (Refined Preferred Alternative 8) to 53.23 (Alternative 5) acres of wetlands to mitigate direct impacts to 3.43 acres (Refined Preferred Alternative 8) to 16.06 (Alternative 5) acres. Impacts from “other” projects include a total of 3.95 acres of wetland loss from Sections 4 and 6 of I-69 within Section 5’s geographic scope. Combined direct, indirect, mitigation, and other impacts total a cumulative wetland impact of a 3.23 acre gain for Refined Preferred Alternative 8 to a 33.22 acre gain for Alternative 5 (see **Tables 5.24-7 A-F**). The Tier 1 FEIS identifies 11,155 acres of wetlands in the two-county study area. The cumulative wetland impact (gain) represents a gain of 0.03% to 0.30% of wetland acreage for the two county area. The Refined Preferred Alternative 8 would have a cumulative 3.23 acre gain in wetland acreage (0.03% gain). Mitigation of wetlands impacts, determined in coordination with regulatory agencies, would be required of the other projects causing the impacts.

Streams—

- *Direct:* Approximately 1,835 miles (approximately 9,688,056 linear feet) of streams were identified in Monroe and Morgan counties. By way of comparison, the linear feet of streams within the right-of-way of the Refined Preferred Alternative 8 are 80,582 linear feet. Potential stream impacts include 106,445 linear feet (Alternative 4), 103,165 linear feet (Alternative 5), 85,192 linear feet (Alternative 6), 83,291 linear feet (Alternative 7), 86,404 linear feet (Alternative 8), to 80,582 (Refined Preferred Alternative) within right-of-way.

A habitat assessment of the perennial streams directly impacted by the project indicated the majority of the streams that were assessed received generally low scores, suggesting they may not provide suitable habitat to sustain the plants and animals typically found in this region of Indiana, or that they may be partially supportive of their aquatic life use designations. Only 1 out of the 29 crossing locations using QHEI to score fell into the highest quality category indicating that this stream segment (S5-s288a) of Bryant Creek may be capable of supporting a balanced warm water community. (See **Section 5.19.2, Surface Waters**, for a detailed discussion of the stream assessments conducted in Section 5.)

Draft water quality data provided by IDEM (2012 303(d) list) indicated that there are three impaired waters within the Section 5 corridor; Weimer Lake (FCA), Beanblossom Creek (PCBs), and Indian Creek (*E. coli*). None of the project’s alternatives cross

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Weimer Lake or Indian Creek. However, all of the alternatives cross Beanblossom Creek. Alternative 7 and Refined Preferred Alternative 8 extend an existing pipe culvert along an inlet to Weimer Lake. **Section 5.19, *Water Resources* (Figure 5.19-3)**, shows the location of impaired streams in the vicinity of Section 5. **Section 4.3.2.3, *Rivers, Streams, and Watersheds***, identifies the impaired waterbodies in the vicinity of Section 5 and the causes of their impairment.

As noted in item 6, the above stresses on the waterways in the project area include sewage, agricultural practices, contaminants/road salt in surface water runoff from roadways/parking areas, and historically poor industrial practices.

Potential impacts to streams are addressed in detail in **Section 5.19, *Water Resources***. Mitigation measures for impacts to streams, aquatic habitat, and water quality are described in **Section 7.3.12, *Stream and Water Body Modifications Impacts***, and **Section 7.3.13, *Ecosystems Impacts***, and **Section 7.3.14, *Water Quality Impacts***.

- *Indirect*: Streams would have the same indirect impacts as wetlands, whereby land surrounding the streams could be bought by a developer to build a commercial or residential establishment, and impacts could occur from surface water runoff and construction activities. However, development near streams tends to be adjacent to a stream rather than interrupting the stream to create a proposed development. Depending on the location, type of development, and potential stream/water quality impact, various permitting requirements would have to be met (such as a CWA Section 404 Permit, IDEM Isolated Wetlands Permit, CWA Section 401 Water Quality Certification and NPDES permits authorized under the CWA; IDNR permit approvals for floodway and below the high-water line of lake impacts under the state of Indiana’s Flood Control Act IC 14-28-1 and Navigable Waterways Act IC 14-29-1; construction plan to fulfill Rule 5 requirements (327 IAC 15-5) under NPDES guidelines; etc.). As noted in “Wetlands,” above, the results of FHWA’s analysis of surface water runoff shows that pollutant concentrations due to runoff are within the applicable USEPA criteria. BMPs will be used to prevent non-point source pollution, to control surface water runoff, and to minimize sediment damage to water quality and aquatic habitats. INDOT *Standard Specifications* will govern construction activities to control erosion and subsequent water pollution.

Following resource agency review and comments on the I-69 Section 2 Tier 2 DEIS, additional analysis of potential indirect impacts to streams was conducted. In particular, the USFWS requested more information regarding indirect water quality impacts to streams resulting from induced development associated with the Section 2 project. Based on this comment, additional evaluation was conducted regarding indirect or induced development from I-69 and its associated effect on stream and water quality. From this additional evaluation, it was determined that it is more accurate to state, “while there will inevitably be some indirect impact to streams, any such indirect impact will be insignificant.” That such indirect impacts will be insignificant is supported by the document cited by USFWS in its Section 2 Tier 2 DEIS comment. The USFWS referenced a publication entitled *Measuring the Impact of Development on Maine*



Surface Waters (Morse, Chandler and S. Kahl, 2003). This publication discusses the threshold of land disturbance above which ecological damage to surface waters occurs. The publication states (pages 2-4):

“[t]he percentage of the total impervious area (PTIA), or the amount of the watershed covered by surfaces preventing water infiltration, has been found to be predictive of the amount of stress and degradation to the stream (p.4). Studies from many places in the US have identified a threshold for development at about 10% (PTIA) of the watershed area, above which surface waters become degraded (p.2). Watershed imperviousness (caused by pavement, gravel, roads, sidewalks, driveways and roofs which prevent water from soaking into the soil) was found to be a good predictor of the level of degradation of the overall stream condition” (p. 2).

In addition, the Center of Watershed Protection (CWP) developed the Impervious Cover Model (ICM) as discussed in the Impacts of Impervious Cover on Aquatic Systems (March 2003)⁹. The ICM agrees with the study completed in Maine that when a watershed reaches 10% impervious surface most stream water qualities decline. While the CWP identifies that this model applies to mid-Atlantic, northeast, southeast, upper Midwest, and Pacific Northwest portions of the US where the model has been tested, they also state that limited testing in the lower Midwest agrees with the ICM. The CWP also states that more watershed research is needed in karst regions.

While the publication studied the PTIA thresholds in Maine and the impervious threshold of degradation can be somewhat variable across the nation, the ICM agreed with the study completed in Maine for the upper Midwest and limited testing shows agreement in the lower Midwest. The CWP acknowledged that additional research is needed in karst regions. Because a portion of Section 5 is within a karst region, research was conducted to determine if karst-specific data was available. No data was found specific to karst regions. Therefore, an analysis of the PTIA (using the methodology used in the publication) was completed within the entire Section 5 Study Area for the watersheds that were impacted by Section 5 directly or indirectly.

An analysis was conducted of the twenty-three 14-digit watersheds crossed by Section 5 and its induced growth and calculated both high and low range estimates of PTIA for them based on the 2006 USGS NLCD a subset of the Multi-Resolution Land Characteristics (MRLC) Consortium NLCD. The high and low estimates were based on the ranges that separated the development into different classes. These classes were defined by the NLCD 2006 Land Cover Class Definitions as follows: high development 80-100% impervious surfaces, medium development 50-79% impervious surfaces, low development 20-49% impervious surfaces, and open-development less than 20% impervious surfaces. These are the ranges used in the analysis for percent impervious;

⁹ Center for Watershed Protection. “Impacts of Impervious Cover on Aquatic Systems.” *Watershed Protection Research Monograph No. 1*. Pp 1, 3, 12. 2003. Accessed online via <http://www.cwp.org/store/free-downloads.html>

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however, for open-development 20% impervious was used for the high calculation and 10% (rather than 0.1%) was used for the low.

The analysis was done by calculating the PTIA for each watershed using the above data. Both induced growth as well as No Build growth was included in the analysis by using 25-50% impervious surfaces as the range when there is ample available land for the development. In TAZs where anticipated development exceeded available land, the excess development was included by adding 10-30% impervious surface to the existing developed land only for those acreages of indirect and No Build development predicted to occur on already developed land. This was done in order to increase the PTIA to accommodate the increased density of development. The direct impact, (the estimated I-69 pavement in each watershed) was also included in each total. The analysis was performed for the existing conditions, the 2035 No Build conditions, and 2035 Build conditions.

The analysis indicated that all alternatives had approximately the same PTIA for each specific watershed. The largest difference between any of the watersheds PTIA between alternatives was 0.24%. Eighteen of the twenty-three watersheds fell below the generally accepted PTIA threshold of 10%. Although five of the watersheds fell above the generally accepted PTIA threshold of 10%, it is believed that Section 5 will not result in significant degradation to surface waters. The Clear Creek/Jackson Creek watershed is currently over the 10% threshold in both the low and high PTIA ranges for existing conditions. The East Fork White Lick Creek-Silon Creek watershed also is currently over the 10% threshold for the high PTIA range for existing conditions. The other three watersheds that fell above this threshold (Griffy Creek-Griffy Reservoir Watershed, Indian Creek-Sand Creek Watershed, and the White Lick-Mooresville Watershed) would not exceed the 10% threshold with low range estimates and the high range estimate predicts the 10% threshold being exceeded with No Build growth.

The range for the Clear Creek/Jackson Creek watershed, the most intensively developed watershed, is 16.10% to 31.28% for Refined Preferred Alternative 8. The existing conditions for this watershed range from 12.83% to 23.86%, which is already above the 10% threshold. The 2035 No Build conditions increase this range from 15.84% to 31.00%. This shows an increase of only 0.28% for the high estimates and 0.26% for the low estimates between the 2035 No Build and the 2035 Build conditions for Refined Preferred Alternative 8, including the direct and indirect effects of I-69.

The range for the East Fork White Lick Creek-Silon Creek watershed is 9.83% to 18.78% for Refined Preferred Alternative 8. The existing conditions for this watershed range from 8.30% to 15.63%, which the high end of the range is already above the 10% threshold. The 2035 No Build conditions increase this range from 9.83% to 18.77%. This shows an increase of less than 0.01% for the low estimates and 0.01% for the high estimate between the 2035 No Build and the 2035 Build conditions for Refined Preferred Alternative 8, including the direct and indirect effects of I-69.

The range for the Griffy Creek-Griffy Reservoir watershed is 6.16% to 11.90% for Refined Preferred Alternative 8. The existing conditions for this watershed range from



5.10% to 9.75%. The 2035 No Build conditions increase this range from 5.97% to 11.57%, which already puts the high estimate over the 10% threshold under the high development end of this range. This shows an increase of only 0.19% to 0.33% between the 2035 No Build and the 2035 Build conditions for Refined Preferred Alternative 8.

The range for the Indian Creek-Sand Creek watershed is 5.55% to 10.67% for Refined Preferred Alternative 8. The existing conditions for this watershed range from 4.40% to 8.54%. The 2035 No Build conditions increase this range from 5.20% to 10.24%, which already puts the high estimate over the 10% threshold. This shows an increase of only 0.35% to 0.43% between the 2035 No Build and the 2035 Build conditions for Refined Preferred Alternative 8.

The range for the White Lick Creek-Mooresville watershed is 6.42% to 11.90% for Refined Preferred Alternative 8. The existing conditions for this watershed range from 5.28% to 9.57%. The 2035 No Build conditions increase this range from 6.41% to 11.89%, which already puts the high estimate over the 10% threshold. This shows an increase of only 0.01% between the 2035 No Build and the 2035 Build conditions for Refined Preferred Alternative 8.

There is agreement with the referenced publication: Source Water Protection: Linking Surface Water Quality to the Watershed (Schmitt and Peckenham, 2002), that residential, commercial and highway development does indeed “impact” associated surface waters. However, it is concluded that the direct and/or indirect impacts to streams resulting from the Section 5 project will not result in a significant degradation to surface waters based on an analysis of the PTIA threshold. This conclusion was reached because all five of the watersheds that were over the 10% threshold were already anticipated to be over the 10% threshold without I-69 being built. I-69 would have only increased the No Build PTIA ranges 0.35% to 0.43% in these watersheds.

- *Other:* Tier 2 I-69 Section 4 would potentially impact 39,985 linear feet of streams in Section 5’s geographic scope. Tier 2 I-69 Section 6 would potentially impact 47,700 linear feet in streams in Section 5’s geographic scope. Limestone quarry activities and other projected growth from the 2035 No Build condition are not expected to have direct impacts to streams due to current policies and regulations requiring mitigation of streams. Please note, the geographic scopes of the cumulative impact analyses in adjacent sections will of necessity overlap. As a result, some actions will be counted as cumulative impacts in more than one Tier 2 EIS; thus, the cumulative impacts of the I-69 project as a whole cannot be calculated by “adding up” the cumulative impacts totals that are given in each Tier 2 EIS.
- *Summary:* Direct impacts to streams will result from the crossing of streams by the roadway, requiring the construction of bridges or the placement of culverts/pipes to carry the streams under the road. Direct stream impacts range from 80,582 linear feet (Refined Preferred Alternative 8) to 106,445 linear feet (Alternative 4). Indirect impacts are concluded to be negligible. Other impacts include I-69 Section 4 (39,985 linear feet) and Section 6 (47,700 linear feet). Combined direct (80,582 linear feet), indirect (0 linear feet), and other impacts (87,685 linear feet) for Refined Preferred Alternative 8 total a

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cumulative impact of 168,267 linear feet of impact, approximately 1.7% of the two-county total. Compensatory stream mitigation will be a part of this project. In addition, the plan proposes on-site mitigation that will be completed in all areas suitable within the Section 5 right-of-way to help offset the stream impacts.

A QHEI of five perennial streams and two intermittent streams directly impacted by the project indicated the majority of the streams that were assessed received generally low scores, suggesting they may not provide suitable habitat to sustain the plants and animals typically found in this region of Indiana, or that they may be partially supportive of their aquatic life use designations. The QHEI score at the S5-s288a crossing of Bryant Creek, located east of SR 37, indicates that it may be the only stream segment capable of supporting a balanced warm water community.

Water quality data provided by IDEM (CWA Draft 2012 303d list) indicated that there are three impaired waters within the Section 5 corridor; Weimer Lake, Beanblossom Creek, and Indian Creek. However, only Beanblossom Creek is crossed by the project's alternatives. Alternative 7 and Refined Preferred Alternative 8 extend an existing pipe culvert along an inlet to Weimer Lake.

Karst—

- *Direct:* Highway construction and operation related impacts to identified karst features are unavoidable. As summarized in **Table 5.24-6**, approximately 672 total karst features are found within the Section 5 Karst Study Area, including 319 within the corridor and 353 relevant karst features beyond the corridor. New right-of-way required (beyond the existing SR 37 right-of-way) for Alternatives 4 and 5 accounts for 41% and 39% of the total karst impacts (in acres). The majority of karst impacts are in existing SR 37 right-of-way. New right-of-way to be acquired for Alternatives 6 and 7 accounts for only 23% of the total karst impacts (in acres). New right-of-way to be acquired for Alternative 8 and Refined Preferred Alternative 8 accounts for 24% and 25% of the total karst impacts (in acres), respectively.

Potential karst feature impact totals associated with the six alternatives by karst area are presented in **Section 5.21, Karst Impacts (Table 5.21-2)**. For example, in the Fullerton Pike interchange area, Section 5 alternatives will have an impact on karst features such as sinkholes, could potentially alter karst recharge patterns, and the southern access ramps are within the Cave A recharge area. Alternatives 4 and 5 have increased impacts to accommodate the wider mainline design while Alternatives 6, 7, and 8 have reduced impacts with the narrower mainline. Refined Preferred Alternative 8 impacts are slightly lower with reduced right-of-way within the Cave A recharge area. Total impacts to karst features range from 144 features (439.7 total acres for Alternative 4), 138 features (430.02 total acres for Alternative 5), 109 features (338.5 total acres for Alternative 6), 113 features (340.3 total acres for Alternative 7), 110 features (343.7 total acres for Alternative 8), to 110 features (347.3 total acres for Refined Preferred Alternative 8).

Cave A and Cave B were considered biologically significant due to the state-listed species demonstrated to occupy them. Special measures may be required to protect these



fauna from potential impacts from road construction, operation, and maintenance. The proposed six-lane I-69 will have similar type of direct impacts to the Cave A and Cave B Systems as the existing four-lane SR 37. In order to maintain the existing base flow levels in the system, surface treatment of runoff water may be required. Karst springs are present within these caves. An assessment was made of the project's potential to cause indirect impacts to state listed cave biota from changes in drainage areas contributing recharge to the cave springs as well as karst groundwater quantity and quality. Findings of this assessment conclude that the project will not result in such changes of a sufficient magnitude to adversely affect the identified state listed species. Analysis which shows that these species will not be adversely affected is provided in **Section 5.17, *Threatened and Endangered Species***.

In accordance with the Karst MOU, unavoidable impacts upon karst features will be mitigated through implementation of alternative drainage, where feasible. If alternative drainage is not possible, impacts will be mitigated through implementation of BMPs, including water quality treatment measures, and appropriate operation and maintenance measures.

While avoidance measures were considered for known caves during the development of the five alternatives, it should be noted that unidentified subterranean karst features are undoubtedly present, and an unknown number of such unidentified features will be encountered and may be impacted during highway construction. Features within the construction limits may be bridged, capped or filled. There is also the potential for changes in drainage patterns if the project were to sever a conduit and reduce flows, or by adding drainage, thereby increasing flows.

The Karst MOU requires that investigations of pollutant loadings are performed for the project area's existing drainage as well as the proposed highway drainage. The degree of impact upon each feature is case-specific depending upon the situation of the feature relative to the proposed work. Calculations of estimates of pollutant loads from the highway and drainage within the right-of-way of the Refined Preferred Alternative 8 were made, including prior to and post construction estimates. Pollutant loads were calculated based on methodology developed by the FHWA (see **Appendix Y, *Final Karst Report [Redacted]***). The calculated pollutant loads for the applicable karst features were tabulated for use by INDOT and the MOU signatory agencies for the evaluation of avoidance, alternative drainage, treatment, and maintenance alternatives and in development of the Erosion and Sediment Control plans, in compliance with the Indiana Handbook for Erosion Control in Developing Areas.

- *Indirect:* Induced growth will change infiltration and stormwater runoff patterns and also will increase the likelihood of potential contaminant introduction impacts to the karst resources. Therefore, residential and commercial developments anticipated with the induced growth in Section 5 and their associated septic systems could negatively impact water quantity and water quality entering karst resources. The induced growth is projected to be 337 homes and 350 jobs within the Study Area. Of the total projected

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growth approximately one-third to one-half would occur within TAZs that contain karst features.

Within the TAZs with induced growth that would potentially affect karst features, Alternative 4 would result in 114 induced homes and 183 induced jobs, converting 34 acres that may indirectly affect relevant karst features. Alternatives 5, 7, 8 and Refined Preferred Alternative 8 would result in 131 induced homes and 183 induced jobs for a total of 37 acres that may indirectly affect relevant karst features. Alternative 6 would result in 171 induced homes and 184 induced jobs for a total of 46 acres that may indirectly affect relevant karst features. The specific number of karst features potentially affected by induced land use changes cannot be determined at this time as this assessment forecast allocated growth at the TAZ level but not for specific parcels. While the identification of karst features within the karst zones of susceptibility in the induced growth areas is beyond the scope of this EIS, it is assumed that induced development within the karst zones of susceptibility will have an impact on karst features. Anticipated induced growth areas are shown in **Figures 5.24-4 A-C** and environmentally sensitive areas in Monroe and Morgan Counties are shown in relation to the TAZs with anticipated induced growth from I-69 on **Figures 5.24-6 A-C**.

Public and private rural water supplies are available to a majority of the Section 5 study area. These are described in **Section 4.3, *Natural Environment***. Many TAZs with karst features and induced growth occur within the water service area of the City of Bloomington Utilities. Therefore it is likely that some percentage of the induced residential and employment related development will make use of the water utility. Private water wells and septic systems exist within these TAZs. A Bloomington Sanitary Sewer Map showing the induced growth TAZ's in relation to existing sanitary sewer service is included as **Figure 5.24-7 A-C**. A major area of induced growth has been identified west of SR 37 at SR 46, known as the North Park development. This area is not currently served by the City of Bloomington utilities. However, as part of the North Park TIF district, utilities will be extended by the developer as development occurs and will tie into the City of Bloomington's system.

Private water wells are present in the project area. Existing groundwater well locations are shown in **Section 4.3, *Natural Environment* (Figure 4.3-7)**. The karst features and ultimately the private wells in the Study Area could potentially be affected by changes in surface runoff to karst features and altered groundwater flowpaths resulting from road construction and the effects of induced growth. However, changes in surface and groundwater quality and quantity within the study area as a result of any of the alternatives are not anticipated to have significant negative effects on drinking water supplies or karst (primarily cave) biota.

The general locations of the identified karst features relative to the Section 5 corridor are depicted in **Section 5.21, *Karst Impacts*, (Figures 5.21-3 and 5.21-4)**. Springs used for individual potable water supplies are present in the project vicinity. Where groundwater from private, individual wells is the principal source of potable water, impacts will be



mitigated on a case-by-case basis. See **Chapter 7, *Mitigation and Commitments***, for a discussion of potential mitigation measures.

Soil associations and shallow bedrock present within the Section 5 project vicinity are described in **Section 4.3, *Natural Environment***. A soil association map also is included as **Figure 4.3-3**. A soil septic absorption map showing soil/septic system suitability for Monroe and Morgan counties is included as **Figures 5.24-5 A-C**.

Local septic system design review and approval processes currently in place in Monroe and Morgan Counties are anticipated to lessen somewhat the negative effects of induced growth upon drinking water supplies. **Section 5.21.3.9, *Cumulative and Indirect Impacts***, describes the potential drinking water quality impacts from induced growth. The following ordinances regulate the design, construction, installation, location, maintenance and operation of on-site wastewater treatment systems.

- Indiana Board of Health Rule 410 IAC 6.8-1 (Indiana State Department of Health, December 1990, http://www.in.gov/isdh/files/410_IAC_6_8_1.pdf).
- Indiana Board of Health Rule 410 IAC 6.10 (Indiana State Department of Health, Date Effective: November 19, 2012, http://www.in.gov/isdh/files/410_IAC_6-10-1.pdf).

The Monroe County *State Route 37 Corridor Plan* was developed as a result of the I-69 Planning Grant Program. The plan recommends working with INDOT to include protection measures identified in the Karst MOU in the I-69 design and increasing buffers required by the existing Chapter 825 Zoning Ordinance to 100 feet or more from a sinkhole conservancy area. In addition to the *State Route 37 Corridor Plan*, the following policy statements are included in the *Monroe County Comprehensive Plan* (2012):

- A. Future growth and development will avoid the disturbance of vulnerable land.
- B. Maintain sparse and low density with the subdivision of rural property.
- C. The presumed future use of rural property shall be the current vested use.
- D. Individual property rights shall be considered when establishing community interest and goals.
- E. The scope of commercial use for rural property that depends upon natural resources available from the land shall be limited to operations related to agriculture or quarrying. Farm-related commercial and industrial uses that are not dependent upon the nature of the land shall not be permitted on rural property.
- F. The conversion of rural property to urban property shall occur when either:
 - a. Inclusion of the rural property fits into an adjacent urban property area (requirement for contiguous growth) or,

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- b. Creation of a new urban property area with the adoption of a new Designated Community Plan that approximates the mean area of the existing designated communities.
- G. Designated Community Plans shall include a full array of field studies demonstrating the availability of adequate public infrastructure and services required for the planned community area, e.g., the Sewer Service Extension Area maps developed in partnership with the Monroe County Plan Commission and the City of Bloomington Utilities Service Board for the Bloomington Urbanizing Area.
- H. Development in urban areas shall provide in aggregate a range of options for residential density, and intensity of commercial and industrial activity.
- I. Urban property shall use sanitary sewers.
- J. Any development adjoining vulnerable land shall provide adequate buffers to minimize the impact of property use upon the vulnerable land.
- K. Urban areas shall designate business and employment activities with areas of sufficient size and capacity to meet the identified needs over the planning horizon.
- L. Prior to development in urban areas, availability of sufficient infrastructure to support expected residential, commercial and industrial activities must be present or provided.
- *Other:* Adjacent to Section 5 on the south end, Section 4 of I-69 would potentially impact 140 karst features; however, Section 6 to the north is not expected to impact karst features identified within the geographic scope of Section 5. Other developments that are anticipated to convert undeveloped land to developed land have the potential to impact karst features, groundwater quality, and cave biota. Other local projects such as the Fullerton Pike extension will evaluate the direct, indirect, and cumulative impacts to karst and other sensitive resources as part of the project's Environmental Assessment. However, a review of Indiana Atlas Site karst data do not identify karst springs or cave recharge areas along the proposed Fullerton Pike extension area.

Changes in groundwater quality and quantity have the potential for associated effects upon private and public drinking water supplies and karst (primarily cave) biota. Under the No Build scenario, an estimated 5,628 acres are anticipated to be developed by the year 2035 and the majority of this would likely occur in karst feature areas. While the identification of karst features within the karst zones of susceptibility in the geographic scope of Section 5 is beyond the scope of this EIS, it is assumed that other developments within the karst zones of susceptibility will have an effect on karst features. Environmentally sensitive areas in Monroe and Morgan Counties are shown in relation to the TAZs with anticipated induced growth from I-69 on **Figures 5.24-6 A-C**.



- *Summary:* Alternatives for Section 5 would directly impact between 110 karst features for Alternative 6 and 144 karst features for Alternative 4. Refined Preferred Alternative 8 is expected to directly impact 110 karst features. The specific number of karst features potentially affected by induced land use changes cannot be determined at this time as this assessment forecast allocated growth at the TAZ level but not for specific parcels. I-69 Section 4 would potentially impact 140 karst features within the Section 5 geographic scope. However, Section 6 would impact no karst features within Section 5's geographic scope. Therefore, combined direct, indirect and other impacts to karst features would be at least 249 features for Alternative 6 and 284 features for Alternative 4. Refined Preferred Alternative 8 would have a total cumulative impact to 250 karst features.

Changes in groundwater and surface water quality and quantity have the potential for associated short and long-term effects upon private and public drinking water supplies and karst (primarily cave) biota. An assessment was made of the projects' potential to cause indirect impacts upon state-listed cave biota from changes in drainage areas contributing recharge to the cave springs as well as karst groundwater quantity and quality. It was concluded that the project will not result in such changes of a sufficient magnitude to adversely affect the identified state-listed species (refer to **Section 5.17, *Threatened and Endangered Species***).

Induced growth within the Study Area will cause more pressure on karst resources including, but not limited to, both groundwater, private drinking water supply wells, and surface water quality. The Monroe County Comprehensive Plan (2012) and Monroe County 2010 SR 37 Corridor Plan were developed as a result of the I-69 Planning Grant Program and are in place to protect karst resources in the project area. These plans identify sensitive environmental areas and recommend further measures including zoning ordinances to protect karst features, water quality, ecosystems and natural resources.

The proposed six-lane I-69 will have similar type of impacts to the Cave A and Cave B Systems as the existing four-lane SR 37. Existing SR 37 right-of-way accounts for over 50% to 85% of the number of karst features, acres of karst features, and acres of relevant karst impacts included in the five alternatives. Impacts upon many known karst features, including most known caves and areas of dense karst feature concentrations, were avoided and or minimized during alternatives development and screening. In order to maintain the existing base flow levels in the system, surface treatment of runoff water may be required.

In accordance with the Karst MOU, unavoidable impacts upon karst features will be mitigated through implementation of alternative drainage, where feasible. If alternative drainage is not possible, impacts will be mitigated through implementation of BMPs, including water quality treatment measures, and appropriate operation and maintenance measures.

Identification of karst resources within the Study Area has included thorough review of previously conducted karst research and extensive research of potentially affected karst features not previously documented. Impacts to karst resources would be similar for any of the five alternatives. Further identification, avoidance, minimization and mitigation

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efforts to protect karst resources from direct and indirect impacts will be ongoing throughout final design and construction of Sections 4 and 5.

10. Modify or add alternatives to avoid, minimize or mitigate significant cumulative impacts.

Efforts to avoid and minimize impacts to farmland, forests, wetlands, streams, and karst features have been incorporated throughout preliminary design and will continue to be considered in final design. These efforts are discussed in the respective resource sections as well as **Chapter 6, Comparison of Alternatives**. Mitigation commitments are summarized in **Chapter 7, Mitigation and Commitments**. A summary is provided on the following pages.

Monroe and Morgan counties participated in the I-69 Community Planning Program (I-69 CPP). FHWA and INDOT provided financial and technical assistance for local land use planning through the I-69 Community Planning Program. This program included grants to local governments to support land use and economic development planning. This program also assisted local governments in developing plans that protect farmland. The grant application program has been developed and grants were made available to eligible communities in two phases beginning in August 2007.

Phase 1 Community Planning Program activities included developing community planning tools, preparing regional planning and economic development strategies for the entire I-69 corridor area, and establishing the framework for the Phase 2 program. The Phase 2 program provided grants of up to \$50,000 for communities to develop planning programs to capture the economic benefits and manage associated growth in a way to protect sensitive environmental resources resulting from the I-69 highway development. Neighboring communities could apply for joint grants; the total amount of these grants could be up to \$50,000 per community. For example, the joint grant described below for Martinsville, Mooresville and Morgan County totaled \$150,000.

I-69 CPP grants totaled \$1,500,000 for the entire Evansville-to-Indianapolis corridor. Eight communities in the vicinity of Section 5 were eligible to apply for I-69 CPP grants. The City of Bloomington had current planning measures in place and opted not to apply for funding. The Town of Ellettsville used the grant to complete a Capital Improvement Plan, an Open Space and Recreation Plan, a Preservation Plan for Wells Park Nature Area and Citizen Planner training for Local Officials. Monroe County used the grant for the preparation of the *State Road 37 Corridor Plan*. The City of Martinsville, Town of Mooresville and Morgan County opted to team together in their planning efforts and used the grant to develop the SR 37/SR 144 Overlay District Plan/Corridor Plan, Comprehensive Plan Updates for Morgan County and Martinsville and a comprehensive plan and Zoning Ordinance Update for Mooresville. The Town of Spencer and Owen County teamed together and used the grant to complete the Comprehensive Plan for Owen County and Town of Spencer including a study of the SR 46 corridor. **Section 7.2, Major Mitigation Initiatives**, describes the program in greater detail.



Farmland—

Agricultural impacts in the form of permanent conversion of farmland to non-farmland use generally cannot be mitigated easily by the creation of new farmland elsewhere. For this reason, the mitigation of agricultural impacts focused on those practices that assist in avoiding and/or minimizing conversion, or designing alignments to minimize disruption to existing agricultural patterns. General practices that were considered in developing alternatives for Section 5 included the following:

- The mainline for I-69 through Section 5 occurs on land already designated for transportation use (existing SR 37), thereby minimizing farmland impacts and disruption of existing agricultural patterns.
- When reasonable, alignments for local access roads were developed to follow existing property lines and minimize dividing or splitting of large tracts of farmland.
- Agricultural property lines were followed where practicable and feasible or fields were crossed at perpendicular angles to reduce point rows and other uneconomic remnants.
- Where cost-effective, access will be provided to parcels that would otherwise be landlocked as a result of the project. Overpasses or underpasses were proposed at several locations to maintain the connectivity of county roads, thereby facilitating access to farm fields and farm operations severed by the interstate.

Forest—

Potential impacts to forests are addressed in detail in **Section 5.20, *Forest Impacts***. Direct upland forest impacts will be mitigated at a 3 to 1 ratio, including 1 to 1 replacement and 2 to 1 preservation for the I-69 Evansville to Indianapolis project as a whole; within individual sections these ratios may vary depending on the mitigation opportunities presented. There is proposed to be a total of approximately 228 (Refined Preferred Alternative 8) to 433 acres (Alternative 4) of upland forest replacement mitigation to offset the approximate 228 to 433 acre direct impact, thereby resulting in no direct loss to forest. Refined Preferred Alternative 8 will have direct impacts to 228 acres of upland forest with subsequent replacement mitigation of 228 acres. It is anticipated that agricultural lands near the corridor will be reforested to provide direct forest replacement mitigation, thereby resulting in no direct loss to forest from I-69 construction. Cumulative land use changes to upland forest are shown in **Tables 5.24-9 A-F** for each alternative. Cumulative impacts from Refined Preferred Alternative 8 are expected to result in a 3,835 acre reduction in forest land.

Wetlands and Streams—

Mitigation for wetland impacts in Section 5 could range from approximately 10.61 acres (Refined Preferred Alternative 8) to 53.23 acres (Alternative 5) (see **Tables 5.24-7 A-F**). Mitigation for open water impacts in Section 5 could range from approximately 0.02 acres (Refined Preferred Alternative 8) to 5.38 acres (Alternative 6). Refined Preferred Alternative 8 will require 10.61 acres of wetland mitigation to offset direct impacts to 3.43 acres of wetlands.

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The cumulative effect of Refined Preferred Alternative 8 is a 3.23 acre gain in wetland acreage (**Table 5.24-7F**).

Cumulative stream impacts for Refined Preferred Alternative 8 are 168,267 linear feet. Stream mitigation will be a part of this project. The *Revised Tier 1 Conceptual Forest and Wetland Mitigation and Enhancement Plan* (in **Appendix S**) includes a commitment to replace wetlands at a ratio of 3 to 1 for forested and scrub/shrub wetlands, and a ratio of 2 to 1 for emergent wetlands. Mitigation for open water impacts are at a ratio of 1 to 1. The no net loss policy coupled with mitigation requirements have, based on coordination with local officials, actually increased the amount of wetlands in the area. In addition, the plan proposes on-site mitigation will be completed in all areas suitable within the Section 5 Preferred Alternative right-of-way to help offset the stream impacts. BMPs will be used to prevent non-point source pollution, to control surface water runoff, and to minimize sediment damage to water quality and aquatic habitats. INDOT *Standard Specifications and Special Provisions* will govern construction activities to control erosion and subsequent water pollution to streams and wetlands. Consequently, it is expected that the project would have minimal impact as a result of runoff on wetlands and streams.

Karst—

The Karst MOU requires that calculations be made of estimates of annual pollutant loads from the highway and drainage within the right-of-way. The degree of impact upon each feature is case-specific depending upon the situation of the feature relative to the proposed work. Unavoidable impacts upon karst features will be mitigated through consideration of alternative drainage. If alternative drainage is not possible, impacts will be mitigated through implementation of BMPs, including water quality treatment measures, and appropriate operation and maintenance measures.

Identification of karst resources within the Study Area has included thorough review of previously conducted karst research and extensive research of potentially affected karst features not previously documented. Impacts to karst resources were considered in the development of the build alternatives. Further identification, avoidance, minimization and mitigation efforts to protect karst resources from direct and indirect impacts will be ongoing throughout final design and construction of Sections 4 and 5. No karst features are anticipated to occur in Section 6.

11. Monitor the cumulative effects of the alternatives and provide documentation.

From among the alternatives developed for this project, Refined Preferred Alternative 8 is being identified as the preferred alternative based on consideration of environmental impacts and performance. Refined Preferred Alternative 8 is approximately 21 miles in length. Alternatives are described in greater detail in **Section 6.2, Comparison of Alignment Alternatives**. Mitigation commitments associated with the potential impacts of Refined Preferred Alternative 8 are described in detail in **Chapter 7, Mitigation and Commitments**.

Monitoring would be an effective practice where potential impacts to karst resources are anticipated. Because it was determined through this analysis that there were no significant impacts to farmland, forests, wetlands, and streams, no monitoring system would be put in place



for these resources. However, per the Karst MOU, INDOT agrees to develop a monitoring and maintenance plan for the affected karst features affected by the highway. IDNR, IDEM and USFWS will be provided an opportunity to review this plan. The establishment of water quality and a point at which a standard is established for remediation will be a part of each monitoring plan. The results of the monitoring will be submitted to IDNR, USFWS and IDEM on a regular basis. It should be noted that several of the mitigation commitments detailed in **Chapter 7, Mitigation and Commitments**, will have ongoing monitoring of resources associated with the commitments.

5.24.4 Summary

Five resources were identified for further analysis of cumulative impacts in Section 5. These resources included farmland, forests, wetlands, streams and karst. Identifying indirect impacts to these resources followed the 11-step process for indirect and cumulative impact analysis developed by the CEQ and identified in Tier 1. The process resulted in the identification of forest land and farmland as the most affected resources in Section 5. Potential impacts to forest and farmland resources warranted a more detailed quantitative analysis of the cumulative impacts of the project. Because forest and farmland are measurable land uses, a more quantitative analysis of direct, indirect and other impacts was completed for these resources. The cumulative analysis of wetlands, streams, and karst included a quantitative analysis of direct impacts where possible, but a more qualitative analysis of impacts from indirect and other projected growth. The summary of cumulative impacts within the geographic scope of Section 5 for all five resources can be found in **Tables 5.24-7 A-F**.

Direct impacts would occur at the same time and place as when the Section 5 project is implemented. Refined Preferred Alternative 8 is the preferred alternative based on consideration of environmental impacts and performance. Alternatives are described in greater detail in **Chapter 6, Comparison of Alternatives**.

The following is a summary of the indirect and cumulative impacts for farmland and forest impacted in the Section 5 Study Area as a result of implementing any of the six alternatives.

Direct impacts on agricultural land will result from the acquisition of agricultural land for additional right-of-way needed for road construction. Total agricultural lands to be acquired would range from 62 acres (Refined Preferred Alternative 8) to 162 acres (Alternative 5) within the proposed right-of-way for this project.

Of the 1,867 upland forest acres within the Section 5 corridor, from 228 acres (Refined Preferred Alternative 8) to 433 acres (Alternative 4) of upland forest are within the proposed right-of-way for this project.

Induced growth is anticipated to account for 32 to 37 acres of agricultural land and 40 to 47 acres of forest conversion by the year 2035. Refined Preferred Alternative 8 would result in the conversion of 37 acres of agricultural land and 47 acres of upland forest. Total loss of agricultural land due to mitigation for forest and wetland losses will be approximately 239 to 472 acres for Refined Preferred Alternative 8 and Alternative 4, respectively. There is proposed to be a total of approximately 228 acres (Refined Preferred Alternative 8) to 433 acres (Alternative 4) of forest replacement mitigation to offset the approximate 228 to 433 acres direct impact,

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thereby resulting in no net direct loss of forest. The impacts of other projects to agricultural land and forest resources within Section 5's geographic scope have also been considered. By the year 2035 for the No Build scenario, it is anticipated that within the two counties, the geographic scope of this Section 5 analysis, the baseline population and employment growth will convert 2,385 acres of agricultural land to non-agricultural land and 3,244 acres of forest land to developed land (see **Tables 5.24-7 A-F** and **Tables 5.24-8 A-F**). This growth is anticipated with or without the I-69 project, and is considered "other" development that is calculated into the overall anticipated impacts. Sections 4 and 6's impacts within the Section 5 geographic scope would be a total of 568 acres of agricultural lands and 544 acres of forest.

In summary, the Refined Preferred Alternative 8 combined direct (62 acres), indirect (37 acres), mitigation (239 acres), and other (2,953 acres) impacts to agricultural land that are reasonably foreseeable to occur would result in the cumulative conversion of 3,291 acres of agricultural land. Alternative 4 combined direct (151 acres), indirect (32 acres), mitigation (472 acres) and other (2,953 acres) impacts to agricultural land that are reasonably foreseeable to occur would result in the cumulative conversion of 3,608 acres of agricultural land. Alternative 5 combined direct (162 acres), indirect (37 acres), mitigation (449 acres) and other (2,953 acres) impacts to agricultural land that are reasonably foreseeable to occur would result in the cumulative conversion of 3,601 acres of agricultural land. Alternative 6 combined direct (67 acres), indirect (33 acres), mitigation (275 acres) and other (2,953 acres) impacts to agricultural land that are reasonably foreseeable to occur would result in the cumulative conversion of 3,328 acres of agricultural land. Alternative 7 combined direct (72 acres), indirect (37 acres), mitigation (249 acres) and other (2,953 acres) impacts to agricultural land that are reasonably foreseeable to occur would result in the cumulative conversion of 3,311 acres of agricultural land. Alternative 8 combined direct (69 acres), indirect (37 acres), mitigation (282 acres), and other (2,953 acres) impacts to agricultural land that are reasonably foreseeable to occur would result in the cumulative conversion of 3,341 acres of agricultural land. In 2007, within Monroe and Morgan counties, there were 167,674 acres of agricultural lands in the United States Agricultural Census. Therefore, the cumulative impact is approximately 2.0% to 2.2% of the current amount of agricultural lands within the two counties. **Tables 5.24-7 A-F** and **Tables 5.24-8 A-F** summarize the cumulative land use changes for agricultural land.

Combined direct (228 to 433 acres), indirect (40 to 47 acres) and other (3,788 acres) forest impacts reasonably foreseeable to occur would result in the cumulative conversion of 4,063 acres (Refined Preferred Alternative 8) to 4,261 acres (Alternative 4) of forest to non-forest use. There is proposed to be a total of approximately 228 to 433 acres of forest mitigation to offset the approximate 228 to 433 acre direct impact, thereby resulting in no direct loss to forest. After accounting for the 228 to 433 acres of replacement forest from mitigation, the total cumulative conversion of forest acreage ranges from 3,828 acres (Alternative 4) to 3,835 acres (Alternative 5, 7, 8, and Refined Preferred Alternative 8). **Tables 5.24-7 A-F** and **Tables 5.24-9 A-F** summarize the cumulative land use changes for forest land.

Combined direct (3.43 to 16.06 acres) and other (3.95 acres) wetland impacts would result in the cumulative conversion of 7.38 acres (Refined Preferred Alternative 8) to 20.01 acres (Alternative 5) of non-open water wetlands. Mitigation for wetland impacts in Section 5 would range from approximately 10.61 acres (Refined Preferred Alternative 8) to 53.23 acres (Alternative 5). After accounting for mitigation, the total cumulative conversion of wetlands would range from a net



gain of 3.23 acres (Refined Preferred Alternative 8) to a net gain of 33.22 acres (Alternative 5). **Tables 5.24-7 A-F** summarize the cumulative land use changes for wetlands.

Combined direct (80,582 to 106,445 linear feet) and other (87,685 linear feet) stream impacts would result in the cumulative conversion of 168,267 linear feet (Refined Preferred Alternative 8) to 194,130 linear feet (Alternative 4) of streams. Refined Preferred Alternative 8 would result in a total cumulative impact of 168,267 linear feet of streams. Stream mitigation will be determined during final design. **Tables 5.24-7 A-F** summarize the cumulative land use changes for streams.

Combined direct (109 to 144 karst features) and other (140 karst features) karst feature impacts would result in impacts to 249 karst features (Alternative 6) to 284 karst features (Alternative 4). Refined Preferred Alternative 8 would result in a total cumulative impact to 250 karst features. **Tables 5.24-7 A-F** summarize the cumulative changes for karst features.

Monroe and Morgan counties have structured land use planning, subdivision and zoning regulations. Therefore, since these tools are in place to promote desired land uses and protect natural resources within Monroe and Morgan counties, the indirect effects of the project on farmland, forest, wetlands, streams, and karst will be possible to regulate.

Tables 5.24-7 A-F show the direct and indirect impacts to all five resources associated with I-69 Section 5, and the direct impacts associated with other major projects within the geographic scope of Section 5. The results of the analysis of cumulative impacts to agricultural and forest resources are summarized on **Tables 5.24-8 A-F** and **Tables 5.24-9 A-F**, respectively.

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Table 5.24-7A: Alternative 4: Impacts of I-69 Section 5 and Other Major Projects Within the Section's Geographic Scope

Potential Impacts to...	I-69 - Tier 2 Section 5 (Monroe & Morgan Cos.)			I-69 - Tier 2 Section 4 (Monroe Co.)	I-69 - Tier 2 Section 6 (Morgan Co.)	Other Projected Growth	ESTIMATED TOTAL IMPACTS
	Alternative 4			Selected Alternative (Refined Preferred Alternative 2)	Tier 1 BA Representative Alignment	Ag/Forest No Build Growth	
	Direct	Indirect	Mitigation*				
Agricultural Land (ac)	-151	-32	-472	-209	-359	-2,385	-3,608 reduction
Upland Forests (ac)	-433	-40	433	-335	-209	-3,244	-3,828 reduction
Wetlands (ac)	-11.70	0	39.11	-0.15	-3.80	0**	23.46 net gain
Streams (lf)	106,445	0	BMPs	39,985	47,700	0**	194,130
Karst (features)***	144	Has not been determined	BMPs	140	0	Has not been determined	284

Sources:

Agricultural Land, see **Table 5.3-1** and **Table 5.24-2**; Upland Forests, see **Table 5.20-2** and **Table 5.24-2**; Wetlands, see **Table 5.19-18**; Streams, see **Table 5.19-18**; Karst, see **Table 5.21-2**.

Section 4 impacts (within Section 5's geographic scope) are based on design right-of-way as of August 22, 2012 and may differ from July 2011 FEIS.

Section 6 impacts (within Section 5's geographic scope) are based on the Tier 1 BA Addendum Representative Alignment. The representative alignment was defined as "the footprint for the alternative with the largest Tier 2 forest impacts, among those alternatives that were still under study as of November 14, 2005."

Notes:***Mitigation:**

Agricultural land will be used to provide forest and wetland mitigation.

Upland Forest mitigation is provided at a 3:1 ratio, however reforestation (requiring the conversion of agricultural land) will be at 1:1 ratio and preservation of existing forest at 2:1 ratio. See **Table 5.20-6** for total forest mitigation.

See **Table 5.19-15** for wetland mitigation.

Section 5.19, Water Resources, **Section 5.20**, Forest Impacts, and **Section 5.21**, Karst Impacts, describe the methodology used to identify appropriate mitigation measures for impacts to water resources, forests, and karst respectively.

**Quantifiable data for these impacts are not available for "Other" projects. However, as with Section 5 of I-69, direct impacts to wetlands and streams would be mitigated at appropriate ratios in consultation with resource agencies and as required by permitting stipulations.

***Direct karst impacts include 77 features within the existing SR 37 right-of-way. The identification of karst features within the two county induced and No Build growth areas has not been completed as part of this study.

Stream and karst impacts are not treated as reductions or gains.

Subtotals have been rounded.



Table 5.24-7B: Alternative 5: Impacts of I-69 Section 5 and Other Major Projects Within the Section's Geographic Scope

Potential Impacts to...	I-69 - Tier 2 Section 5 (Monroe & Morgan Cos.)			I-69 - Tier 2 Section 4 (Monroe Co.)	I-69 - Tier 2 Section 6 (Morgan Co.)	Other Projected Growth	ESTIMATED TOTAL IMPACTS
	Alternative 5			Selected Alternative (Refined Preferred Alternative 2)	Tier 1 BA Representative Alignment	Ag/Forest No Build Growth	
	Direct	Indirect	Mitigation*				
Agricultural Land (ac)	-162	-37	-449	-209	-359	-2,385	-3,601 reduction
Upland Forests (ac)	-396	-47	396	-335	-209	-3,244	-3,835 reduction
Wetlands (ac)	-16.06	0	53.23	-0.15	-3.80	0**	33.22 net gain
Streams (lf)	103,165	0	BMPs	39,985	47,700	0**	190,850
Karst (features)***	138	Has not been determined	BMPs	140	0	Has not been determined	278

Sources:

Agricultural Land, see **Table 5.3-1** and **Table 5.24-2**; Upland Forests, see **Table 5.20-2** and **Table 5.24-2**; Wetlands, see **Table 5.19-18**; Streams, see **Table 5.19-18**; Karst, see **Table 5.21-2**.

Section 4 impacts (within Section 5's geographic scope) are based on design right-of-way as of August 22, 2012 and may differ from July 2011 FEIS.

Section 6 impacts (within Section 5's geographic scope) are based on the Tier 1 BA Addendum Representative Alignment. The representative alignment was defined as "the footprint for the alternative with the largest Tier 2 forest impacts, among those alternatives that were still under study as of November 14, 2005."

Notes:

***Mitigation:**

Agricultural land will be used to provide forest and wetland mitigation.

Upland Forest mitigation is provided at a 3:1 ratio, however reforestation (requiring the conversion of agricultural land) will be at 1:1 ratio and preservation of existing forest at 2:1 ratio. See **Table 5.20-6** for total forest mitigation.

See **Table 5.19-15** for wetland mitigation.

Section 5.19, Water Resources, **Section 5.20**, Forest Impacts, and **Section 5.21**, Karst Impacts, describe the methodology used to identify appropriate mitigation measures for impacts to water resources, forests, and karst respectively.

**Quantifiable data for these impacts are not available for "Other" projects. However, as with Section 5 of I-69, direct impacts to wetlands and streams would be mitigated at appropriate ratios in consultation with resource agencies and as required by permitting stipulations.

***Direct karst impacts include 77 features within the existing SR 37 right-of-way. The identification of karst features within the two county induced and No Build growth areas has not been completed as part of this study.

Stream and karst impacts are not treated as reductions or gains.

Subtotals have been rounded.

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Table 5.24-7C: Alternative 6: Impacts of I-69 Section 5 and Other Major Projects Within the Section's Geographic Scope

Potential Impacts to...	I-69 - Tier 2 Section 5 (Monroe & Morgan Cos.)			I-69 - Tier 2 Section 4 (Monroe Co.)	I-69 - Tier 2 Section 6 (Morgan Co.)	Other Projected Growth	ESTIMATED TOTAL IMPACTS
	Alternative 6			Selected Alternative (Refined Preferred Alternative 2)	Tier 1 BA Representative Alignment	Ag/Forest No Build Growth	
	Direct	Indirect	Mitigation*				
Agricultural Land (ac)	-67	-33	-275	-209	-359	-2,385	-3,328 reduction
Upland Forests (ac)	-239	-41	239	-335	-209	-3,244	-3,829 reduction
Wetlands (ac)	-10.96	0	35.96	-0.15	-3.80	0**	21.05 net gain
Streams (lf)	85,192	0	BMPs	39,985	47,700	0**	172,877
Karst (features)***	109	Has not been determined	BMPs	140	0	Has not been determined	249

Sources:

Agricultural Land, see **Table 5.3-1** and **Table 5.24-2**; Upland Forests, see **Table 5.20-2** and **Table 5.24-2**; Wetlands, see **Table 5.19-18**; Streams, see **Table 5.19-18**; Karst, see **Table 5.21-2**.

Section 4 impacts (within Section 5's geographic scope) are based on design right-of-way as of August 22, 2012 and may differ from July 2011 FEIS.

Section 6 impacts (within Section 5's geographic scope) are based on the Tier 1 BA Addendum Representative Alignment. The representative alignment was defined as "the footprint for the alternative with the largest Tier 2 forest impacts, among those alternatives that were still under study as of November 14, 2005."

Notes:***Mitigation:**

Agricultural land will be used to provide forest and wetland mitigation.

Upland Forest mitigation is provided at a 3:1 ratio, however reforestation (requiring the conversion of agricultural land) will be at 1:1 ratio and preservation of existing forest at 2:1 ratio. See **Table 5.20-6** for total forest mitigation.

See **Table 5.19-15** for wetland mitigation.

Section 5.19, Water Resources, **Section 5.20**, Forest Impacts, and **Section 5.21**, Karst Impacts, describe the methodology used to identify appropriate mitigation measures for impacts to water resources, forests, and karst respectively.

**Quantifiable data for these impacts are not available for "Other" projects. However, as with Section 5 of I-69, direct impacts to wetlands and streams would be mitigated at appropriate ratios in consultation with resource agencies and as required by permitting stipulations.

***Direct karst impacts include 77 features within the existing SR 37 right-of-way. The identification of karst features within the two county induced and No Build growth areas has not been completed as part of this study.

Stream and karst impacts are not treated as reductions or gains.

Subtotals have been rounded.



Table 5.24-7D: Alternative 7: Impacts of I-69 Section 5 and Other Major Projects Within the Section's Geographic Scope

Potential Impacts to...	I-69 - Tier 2 Section 5 (Monroe & Morgan Cos.)			I-69 - Tier 2 Section 4 (Monroe Co.)	I-69 - Tier 2 Section 6 (Morgan Co.)	Other Projected Growth	ESTIMATED TOTAL IMPACTS
	Alternative 7			Selected Alternative (Refined Preferred Alternative 2)	Tier 1 BA Representative Alignment	Ag/Forest No Build Growth	
	Direct	Indirect	Mitigation*				
Agricultural Land (ac)	-72	-37	-249	-209	-359	-2,385	-3,311 reduction
Upland Forests (ac)	-233	-47	233	-335	-209	-3,244	-3,835 reduction
Wetlands (ac)	-5.18	0	16.39	-0.15	-3.80	0**	7.26 net gain
Streams (lf)	83,291	0	BMPs	39,985	47,700	0**	170,976
Karst (features)***	113	Has not been determined	BMPs	140	0	Has not been determined	253

Sources:

Agricultural Land, see **Table 5.3-1** and **Table 5.24-2**; Upland Forests, see **Table 5.20-2** and **Table 5.24-2**; Wetlands, see **Table 5.19-18**; Streams, see **Table 5.19-18**; Karst, see **Table 5.21-2**.

Section 4 impacts (within Section 5's geographic scope) are based on design right-of-way as of August 22, 2012 and may differ from July 2011 FEIS.

Section 6 impacts (within Section 5's geographic scope) are based on the Tier 1 BA Addendum Representative Alignment. The representative alignment was defined as "the footprint for the alternative with the largest Tier 2 forest impacts, among those alternatives that were still under study as of November 14, 2005."

Notes:

***Mitigation:**

Agricultural land will be used to provide forest and wetland mitigation.

Upland Forest mitigation is provided at a 3:1 ratio, however reforestation (requiring the conversion of agricultural land) will be at 1:1 ratio and preservation of existing forest at 2:1 ratio. See **Table 5.20-6** for total forest mitigation.

See **Table 5.19-15** for wetland mitigation.

Section 5.19, Water Resources, **Section 5.20**, Forest Impacts, and **Section 5.21**, Karst Impacts, describe the methodology used to identify appropriate mitigation measures for impacts to water resources, forests, and karst respectively.

**Quantifiable data for these impacts are not available for "Other" projects. However, as with Section 5 of I-69, direct impacts to wetlands and streams would be mitigated at appropriate ratios in consultation with resource agencies and as required by permitting stipulations.

***Direct karst impacts include 77 features within the existing SR 37 right-of-way. The identification of karst features within the two county induced and No Build growth areas has not been completed as part of this study.

Stream and karst impacts are not treated as reductions or gains.

Subtotals have been rounded.

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Table 5.24-7E: Alternative 8: Impacts of I-69 Section 5 and Other Major Projects Within the Section's Geographic Scope

Potential Impacts to...	I-69 - Tier 2 Section 5 (Monroe & Morgan Cos.)			I-69 - Tier 2 Section 4 (Monroe Co.)	I-69 - Tier 2 Section 6 (Morgan Co.)	Other Projected Growth	ESTIMATED TOTAL IMPACTS
	Alternative 8			Selected Alternative (Refined Preferred Alternative 2)	Tier 1 BA Representative Alignment	Ag/Forest No Build Growth	
	Direct	Indirect	Mitigation*				
Agricultural Land (ac)	-69	-37	-282	-209	-359	-2,385	-3,341 reduction
Upland Forests (ac)	-249	-47	249	-335	-209	-3,244	-3,835 reduction
Wetlands (ac)	-9.96	0	32.83	-0.15	-3.80	0**	18.92 net gain
Streams (lf)	86,404	0	BMPs	39,985	47,700	0**	174,089
Karst (features)***	110	Has not been determined	BMPs	140	0	Has not been determined	250

Sources:

Agricultural Land, see **Table 5.3-1** and **Table 5.24-2**; Upland Forests, see **Table 5.20-2** and **Table 5.24-2**; Wetlands, see **Table 5.19-18**; Streams, see **Table 5.19-18**; Karst, see **Table 5.21-2**.

Section 4 impacts (within Section 5's geographic scope) are based on design right-of-way as of August 22, 2012 and may differ from July 2011 FEIS.

Section 6 impacts (within Section 5's geographic scope) are based on the Tier 1 BA Addendum Representative Alignment. The representative alignment was defined as "the footprint for the alternative with the largest Tier 2 forest impacts, among those alternatives that were still under study as of November 14, 2005."

Notes:***Mitigation:**

Agricultural land will be used to provide forest and wetland mitigation.

Upland Forest mitigation is provided at a 3:1 ratio, however reforestation (requiring the conversion of agricultural land) will be at 1:1 ratio and preservation of existing forest at 2:1 ratio. See **Table 5.20-6** for total forest mitigation.

See **Table 5.19-15** for wetland mitigation.

Section 5.19, Water Resources, Section 5.20, Forest Impacts, and Section 5.21, Karst Impacts, describe the methodology used to identify appropriate mitigation measures for impacts to water resources, forests, and karst respectively.

**Quantifiable data for these impacts are not available for "Other" projects. However, as with Section 5 of I-69, direct impacts to wetlands and streams would be mitigated at appropriate ratios in consultation with resource agencies and as required by permitting stipulations.

***Direct karst impacts include 77 features within the existing SR 37 right-of-way. The identification of karst features within the two county induced and No Build growth areas has not been completed as part of this study.

Stream and karst impacts are not treated as reductions or gains.

Subtotals have been rounded.



Table 5.24-7F: Refined Preferred Alternative 8: Impacts of I-69 Section 5 and Other Major Projects Within the Section's Geographic Scope

Potential Impacts to...	I-69 - Tier 2 Section 5 (Monroe & Morgan Cos.)			I-69 - Tier 2 Section 4 (Monroe Co.)	I-69 - Tier 2 Section 6 (Morgan Co.)	Other Projected Growth	ESTIMATED TOTAL IMPACTS
	Refined Preferred Alternative 8			Selected Alternative (Refined Preferred Alternative 2)	Tier 1 BA Representative Alignment	Ag/Forest No Build Growth	
	Direct	Indirect	Mitigation*				
Agricultural Land (ac)	-62	-37	-239	-209	-359	-2,385	-3,291 reduction
Upland Forests (ac)	-228	-47	228	-335	-209	-3,244	-3,835 reduction
Wetlands (ac)	-3.43	0	10.61	-0.15	-3.80	0**	3.23 net gain
Streams (lf)	80,582	0	BMPs	39,985	47,700	0**	168,267
Karst (features)***	110	Has not been determined	BMPs	140	0	Has not been determined	250

Sources:

Agricultural Land, see **Table 5.3-1** and **Table 5.24-2**; Upland Forests, see **Table 5.20-2** and **Table 5.24-2**; Wetlands, see **Table 5.19-18**; Streams, see **Table 5.19-18**; Karst, see **Table 5.21-2**.

Section 4 impacts (within Section 5's geographic scope) are based on design right-of-way as of August 22, 2012 and may differ from July 2011 FEIS.

Section 6 impacts (within Section 5's geographic scope) are based on the Tier 1 BA Addendum Representative Alignment. The representative alignment was defined as "the footprint for the alternative with the largest Tier 2 forest impacts, among those alternatives that were still under study as of November 14, 2005."

Notes:

***Mitigation:**

Agricultural land will be used to provide forest and wetland mitigation.

Upland Forest mitigation is provided at a 3:1 ratio, however reforestation (requiring the conversion of agricultural land) will be at 1:1 ratio and preservation of existing forest at 2:1 ratio. See **Table 5.20-6** for total forest mitigation.

See **Table 5.19-15** for wetland mitigation.

Section 5.19, Water Resources, **Section 5.20**, Forest Impacts, and **Section 5.21**, Karst Impacts, describe the methodology used to identify appropriate mitigation measures for impacts to water resources, forests, and karst respectively.

**Quantifiable data for these impacts are not available for "Other" projects. However, as with Section 5 of I-69, direct impacts to wetlands and streams would be mitigated at appropriate ratios in consultation with resource agencies and as required by permitting stipulations.

***Direct karst impacts include 77 features within the existing SR 37 right-of-way. The identification of karst features within the two county induced and No Build growth areas has not been completed as part of this study.

Stream and karst impacts are not treated as reductions or gains.

Subtotals have been rounded.

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Table 5.24-8A: Alternative 4: Summary of Cumulative Land Use Changes to Agricultural Land

Land Use Changes as a result of	Tier 2 I-69 Section 5 - Alternative 4			"Other" Projects				Cumulative Impacts
	I-69 Tier 2 Section 5 In Monroe County (Column A)	I-69 Tier 2 Section 5 In Morgan County (Column B)	Total I-69 Tier 2 Section 5 (Column C = A+B)	I-69 - Tier 2 Section 4 In Monroe County (Column D)	I-69 - Tier 2 Section 6 Worst Case In Morgan County (Column E)	"Other" Projected Growth in Monroe and Morgan County (Column F)	Total "Other" Projects (Column G = D+E+F)	Total I-69 Tier 2 Section 5 and Total "Other" Projects (Column H = C + G)
Direct Conversion of Agricultural Land (Acres)	-98	-53	-151	-209	-359	-2,385	-2,953	-3,104
Indirect / Induced Conversion of Agricultural Land (Acres)	-13	-19	-32	Not Applicable	Not Applicable	Not Applicable	Not Applicable	-32
Mitigation	-369	-103	-472	Not Applicable	Not Applicable	Not Applicable	Not Applicable	-472
TOTALS	-480	-175	-655	-209	-359	-2,385	-2,953	-3,608

Notes:

Mitigation conversion of agricultural lands by I-69 Section 5 includes conversion of agricultural land to provide forest and wetland mitigation. For these purposes, mitigation is assumed to take place within the same county as the direct impact, although this may not necessarily be the case.

Section 4 impacts (within Section 5's geographic scope) are based on design right-of-way as of August 22, 2012 and may differ from July 2011 FEIS.

Section 6 impacts (within Section 5's geographic scope) are based on the Tier 1 BA Addendum Representative Alignment. The representative alignment was defined as "the footprint for the alternative with the largest Tier 2 forest impacts, among those alternatives that were still under study as of November 14, 2005."

Other Projected Growth is the growth expected in the Section 5 geographic scope that is expected to occur even if I-69 is not constructed (the No Build scenario) and which is not attributed to the remaining Other projects listed in the table.

Subtotals have been rounded.



Table 5.24-8B Alternative 5: Summary of Cumulative Land Use Changes to Agricultural Land

Land Use Changes as a result of	Tier 2 I-69 Section 5 - Alternative 5			"Other" Projects				Cumulative Impacts
	I-69 Tier 2 Section 5 In Monroe County (Column A)	I-69 Tier 2 Section 5 In Morgan County (Column B)	Total I-69 Tier 2 Section 5 (Column C = A+B)	I-69 - Tier 2 Section 4 In Monroe County (Column D)	I-69 - Tier 2 Section 6 Worst Case In Morgan County (Column E)	"Other" Projected Growth in Monroe and Morgan County (Column F)	Total "Other" Projects (Column G = D+E+F)	Total I-69 Tier 2 Section 5 and Total "Other" Projects (Column H = C + G)
Direct Conversion of Agricultural Land (Acres)	-73	-89	-162	-209	-359	-2,385	-2,953	-3,115
Indirect / Induced Conversion of Agricultural Land (Acres)	-17	-20	-37	Not Applicable	Not Applicable	Not Applicable	Not Applicable	-37
Mitigation	-381	-68	-449	Not Applicable	Not Applicable	Not Applicable	Not Applicable	-449
TOTALS	-471	-177	-648	-209	-359	-2,385	-2,953	-3,601

Notes:

Mitigation conversion of agricultural lands by I-69 Section 5 includes conversion of agricultural land to provide forest and wetland mitigation. For these purposes, mitigation is assumed to take place within the same county as the direct impact, although this may not necessarily be the case.

Section 4 impacts (within Section 5's geographic scope) are based on design right-of-way as of August 22, 2012 and may differ from July 2011 FEIS.

Section 6 impacts (within Section 5's geographic scope) are based on the Tier 1 BA Addendum Representative Alignment. The representative alignment was defined as "the footprint for the alternative with the largest Tier 2 forest impacts, among those alternatives that were still under study as of November 14, 2005."

Other Projected Growth is the growth expected in the Section 5 geographic scope that is expected to occur even if I-69 is not constructed (the No Build scenario) and which is not attributed to the remaining Other projects listed in the table.

Subtotals have been rounded.

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Table 5.24-8C: Alternative 6: Summary of Cumulative Land Use Changes to Agricultural Land

Land Use Changes as a result of	Tier 2 I-69 Section 5 - Alternative 6			"Other" Projects				Cumulative Impacts
	I-69 Tier 2 Section 5 In Monroe County (Column A)	I-69 Tier 2 Section 5 In Morgan County (Column B)	Total I-69 Tier 2 Section 5 (Column C = A+B)	I-69 - Tier 2 Section 4 In Monroe County (Column D)	I-69 - Tier 2 Section 6 Worst Case In Morgan County (Column E)	"Other" Projected Growth in Monroe and Morgan County (Column F)	Total "Other" Projects (Column G = D+E+F)	Total I-69 Tier 2 Section 5 and Total "Other" Projects (Column H = C + G)
Direct Conversion of Agricultural Land (Acres)	-28	-39	-67	-209	-359	-2,385	-2,953	-3,020
Indirect / Induced Conversion of Agricultural Land (Acres)	-13	-20	-33	Not Applicable	Not Applicable	Not Applicable	Not Applicable	-33
Mitigation	-231	-44	-275	Not Applicable	Not Applicable	Not Applicable	Not Applicable	-275
TOTALS	-272	-103	-375	-209	-359	-2,385	-2,953	-3,328

Notes:

Mitigation conversion of agricultural lands by I-69 Section 5 includes conversion of agricultural land to provide forest and wetland mitigation. For these purposes, mitigation is assumed to take place within the same county as the direct impact, although this may not necessarily be the case.

Section 4 impacts (within Section 5's geographic scope) are based on design right-of-way as of August 22, 2012 and may differ from July 2011 FEIS.

Section 6 impacts (within Section 5's geographic scope) are based on the Tier 1 BA Addendum Representative Alignment. The representative alignment was defined as "the footprint for the alternative with the largest Tier 2 forest impacts, among those alternatives that were still under study as of November 14, 2005."

Other Projected Growth is the growth expected in the Section 5 geographic scope that is expected to occur even if I-69 is not constructed (the No Build scenario) and which is not attributed to the remaining Other projects listed in the table.

Subtotals have been rounded.



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Table 5.24-8D: Alternative 7: Summary of Cumulative Land Use Changes to Agricultural Land

Land Use Changes as a result of	Tier 2 I-69 Section 5 - Alternative 7			"Other" Projects				Cumulative Impacts
	I-69 Tier 2 Section 5 In Monroe County (Column A)	I-69 Tier 2 Section 5 In Morgan County (Column B)	Total I-69 Tier 2 Section 5 (Column C = A+B)	I-69 - Tier 2 Section 4 In Monroe County (Column D)	I-69 - Tier 2 Section 6 Worst Case In Morgan County (Column E)	"Other" Projected Growth in Monroe and Morgan County (Column F)	Total "Other" Projects (Column G = D+E+F)	Total I-69 Tier 2 Section 5 and Total "Other" Projects (Column H = C + G)
Direct Conversion of Agricultural Land (Acres)	-24	-48	-72	-209	-359	-2,385	-2,953	-3,025
Indirect / Induced Conversion of Agricultural Land (Acres)	-17	-20	-37	Not Applicable	Not Applicable	Not Applicable	Not Applicable	-37
Mitigation	-203	-46	-249	Not Applicable	Not Applicable	Not Applicable	Not Applicable	-249
TOTALS	-244	-114	-358	-209	-359	-2,385	-2,953	-3,311

Notes:

Mitigation conversion of agricultural lands by I-69 Section 5 includes conversion of agricultural land to provide forest and wetland mitigation. For these purposes, mitigation is assumed to take place within the same county as the direct impact, although this may not necessarily be the case.

Section 4 impacts (within Section 5's geographic scope) are based on design right-of-way as of August 22, 2012 and may differ from July 2011 FEIS.

Section 6 impacts (within Section 5's geographic scope) are based on the Tier 1 BA Addendum Representative Alignment. The representative alignment was defined as "the footprint for the alternative with the largest Tier 2 forest impacts, among those alternatives that were still under study as of November 14, 2005."

Other Projected Growth is the growth expected in the Section 5 geographic scope that is expected to occur even if I-69 is not constructed (the No Build scenario) and which is not attributed to the remaining Other projects listed in the table.

Subtotals have been rounded.

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Table 5.24-8E: Alternative 8: Summary of Cumulative Land Use Changes to Agricultural Land

Land Use Changes as a result of	Tier 2 I-69 Section 5 - Alternative 8			"Other" Projects				Cumulative Impacts
	I-69 Tier 2 Section 5 In Monroe County (Column A)	I-69 Tier 2 Section 5 In Morgan County (Column B)	Total I-69 Tier 2 Section 5 (Column C = A+B)	I-69 - Tier 2 Section 4 In Monroe County (Column D)	I-69 - Tier 2 Section 6 Worst Case In Morgan County (Column E)	"Other" Projected Growth in Monroe and Morgan County (Column F)	Total "Other" Projects (Column G = D+E+F)	Total I-69 Tier 2 Section 5 and Total "Other" Projects (Column H = C + G)
Direct Conversion of Agricultural Land (Acres)	-30	-39	-69	-209	-359	-2,385	-2,953	-3,022
Indirect / Induced Conversion of Agricultural Land (Acres)	-17	-20	-37	Not Applicable	Not Applicable	Not Applicable	Not Applicable	-37
Mitigation	-236	-46	-282	Not Applicable	Not Applicable	Not Applicable	Not Applicable	-282
TOTALS	-283	-105	-388	-209	-359	-2,385	-2,953	-3,341

Notes:

Mitigation conversion of agricultural lands by I-69 Section 5 includes conversion of agricultural land to provide forest and wetland mitigation. For these purposes, mitigation is assumed to take place within the same county as the direct impact, although this may not necessarily be the case.

Section 4 impacts (within Section 5's geographic scope) are based on design right-of-way as of August 22, 2012 and may differ from July 2011 FEIS.

Section 6 impacts (within Section 5's geographic scope) are based on the Tier 1 BA Addendum Representative Alignment. The representative alignment was defined as "the footprint for the alternative with the largest Tier 2 forest impacts, among those alternatives that were still under study as of November 14, 2005."

Other Projected Growth is the growth expected in the Section 5 geographic scope that is expected to occur even if I-69 is not constructed (the No Build scenario) and which is not attributed to the remaining Other projects listed in the table.

Subtotals have been rounded.



Table 5.24-8F: Refined Preferred Alternative 8: Summary of Cumulative Land Use Changes to Agricultural Land

Land Use Changes as a result of	Tier 2 I-69 Section 5 - Refined Preferred Alternative 8			"Other" Projects				Cumulative Impacts
	I-69 Tier 2 Section 5 In Monroe County (Column A)	I-69 Tier 2 Section 5 In Morgan County (Column B)	Total I-69 Tier 2 Section 5 (Column C = A+B)	I-69 - Tier 2 Section 4 In Monroe County (Column D)	I-69 - Tier 2 Section 6 Worst Case In Morgan County (Column E)	"Other" Projected Growth in Monroe and Morgan County (Column F)	Total "Other" Projects (Column G = D+E+F)	Total I-69 Tier 2 Section 5 and Total "Other" Projects (Column H = C + G)
Direct Conversion of Agricultural Land (Acres)	-17	-45	-62	-209	-359	-2,385	-2,953	-3,015
Indirect / Induced Conversion of Agricultural Land (Acres)	-17	-20	-37	Not Applicable	Not Applicable	Not Applicable	Not Applicable	-37
Mitigation	-197	-42	-239	Not Applicable	Not Applicable	Not Applicable	Not Applicable	-239
TOTALS	-231	-107	-338	-209	-359	-2,385	-2,953	-3,291

Notes:

Mitigation conversion of agricultural lands by I-69 Section 5 includes conversion of agricultural land to provide forest and wetland mitigation. For these purposes, mitigation is assumed to take place within the same county as the direct impact, although this may not necessarily be the case.

Section 4 impacts (within Section 5's geographic scope) are based on design right-of-way as of August 22, 2012 and may differ from July 2011 FEIS.

Section 6 impacts (within Section 5's geographic scope) are based on the Tier 1 BA Addendum Representative Alignment. The representative alignment was defined as "the footprint for the alternative with the largest Tier 2 forest impacts, among those alternatives that were still under study as of November 14, 2005."

Other Projected Growth is the growth expected in the Section 5 geographic scope that is expected to occur even if I-69 is not constructed (the No Build scenario) and which is not attributed to the remaining Other projects listed in the table.

Subtotals have been rounded.

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Table 5.24-9A: Alternative 4: Summary of Cumulative Land Use Changes to Upland Forest

Land Use Changes as a result of	Tier 2 I-69 Section 5 - Alternative 4			"Other" Projects				Cumulative Impacts
	I-69 Tier 2 Section 5 In Monroe County (Column A)	I-69 Tier 2 Section 5 In Morgan County (Column B)	Total I-69 Tier 2 Section 5 (Column C = A+B)	I-69 - Tier 2 Section 4 In Monroe County (Column D)	I-69 - Tier 2 Section 6 Worst Case In Morgan County (Column E)	"Other" Projected Growth in Monroe and Morgan County (Column F)	Total "Other" Projects (Column G = D+E+F)	Total I-69 Tier 2 Section 5 and Total "Other" Projects (Column H = C + G)
Direct Conversion of Upland Forest Land (Acres)	-333	-100	-433	-335	-209	-3,244	-3,788	-4,221
Indirect / Induced Conversion of Upland Forest Land (Acres)	-25	-15	-40	Not Applicable	Not Applicable	Not Applicable	Not Applicable	-40
Mitigation	333	100	433	Not Applicable	Not Applicable	Not Applicable	Not Applicable	433
TOTALS	-25	-15	-40	-335	-209	-3,244	-3,788	-3,828

Notes:

Section 4 impacts (within Section 5's geographic scope) are based on design right-of-way as of August 22, 2012 and may differ from July 2011 FEIS.

Section 6 impacts (within Section 5's geographic scope) are based on the Tier 1 BA Addendum Representative Alignment. The representative alignment was defined as "the footprint for the alternative with the largest Tier 2 forest impacts, among those alternatives that were still under study as of November 14, 2005."

Other Projected Growth is the growth expected in the Section 5 geographic scope that is expected to occur even if I-69 is not constructed (the No Build scenario) and which is not attributed to the remaining Other projects listed in the table.

Subtotals have been rounded.



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Table 5.24-9B: Alternative 5: Summary of Cumulative Land Use Changes to Upland Forest

Land Use Changes as a result of	Tier 2 I-69 Section 5 - Alternative 5			"Other" Projects				Cumulative Impacts
	I-69 Tier 2 Section 5 In Monroe County (Column A)	I-69 Tier 2 Section 5 In Morgan County (Column B)	Total I-69 Tier 2 Section 5 (Column C = A+B)	I-69 - Tier 2 Section 4 In Monroe County (Column D)	I-69 - Tier 2 Section 6 Worst Case In Morgan County (Column E)	"Other" Projected Growth in Monroe and Morgan County (Column F)	Total "Other" Projects (Column G = D+E+F)	Total I-69 Tier 2 Section 5 and Total "Other" Projects (Column H = C + G)
Direct Conversion of Upland Forest Land (Acres)	-331	-65	-396	-335	-209	-3,244	-3,788	-4,184
Indirect / Induced Conversion of Upland Forest Land (Acres)	-31	-16	-47	Not Applicable	Not Applicable	Not Applicable	Not Applicable	-47
Mitigation	331	65	396	Not Applicable	Not Applicable	Not Applicable	Not Applicable	396
TOTALS	-31	-16	-47	-335	-209	-3,244	-3,788	-3,835

Notes:

Section 4 impacts (within Section 5's geographic scope) are based on design right-of-way as of August 22, 2012 and may differ from July 2011 FEIS.

Section 6 impacts (within Section 5's geographic scope) are based on the Tier 1 BA Addendum Representative Alignment. The representative alignment was defined as "the footprint for the alternative with the largest Tier 2 forest impacts, among those alternatives that were still under study as of November 14, 2005."

Other Projected Growth is the growth expected in the Section 5 geographic scope that is expected to occur even if I-69 is not constructed (the No Build scenario) and which is not attributed to the remaining Other projects listed in the table.

Subtotals have been rounded.

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Table 5.24-9C: Alternative 6: Summary of Cumulative Land Use Changes to Upland Forest

Land Use Changes as a result of	Tier 2 I-69 Section 5 - Alternative 6			"Other" Projects				Cumulative Impacts
	I-69 Tier 2 Section 5 In Monroe County (Column A)	I-69 Tier 2 Section 5 In Morgan County (Column B)	Total I-69 Tier 2 Section 5 (Column C = A+B)	I-69 - Tier 2 Section 4 In Monroe County (Column D)	I-69 - Tier 2 Section 6 Worst Case In Morgan County (Column E)	"Other" Projected Growth in Monroe and Morgan County (Column F)	Total "Other" Projects (Column G = D+E+F)	Total I-69 Tier 2 Section 5 and Total "Other" Projects (Column H = C + G)
Direct Conversion of Upland Forest Land (Acres)	-196	-43	-239	-335	-209	-3,244	-3,788	-4,027
Indirect / Induced Conversion of Upland Forest Land (Acres)	-25	-16	-41	Not Applicable	Not Applicable	Not Applicable	Not Applicable	-41
Mitigation	196	43	239	Not Applicable	Not Applicable	Not Applicable	Not Applicable	239
TOTALS	-25	-16	-41	-335	-209	-3,244	-3,788	-3,829

Notes:

Section 4 impacts (within Section 5's geographic scope) are based on design right-of-way as of August 22, 2012 and may differ from July 2011 FEIS.

Section 6 impacts (within Section 5's geographic scope) are based on the Tier 1 BA Addendum Representative Alignment. The representative alignment was defined as "the footprint for the alternative with the largest Tier 2 forest impacts, among those alternatives that were still under study as of November 14, 2005."

Other Projected Growth is the growth expected in the Section 5 geographic scope that is expected to occur even if I-69 is not constructed (the No Build scenario) and which is not attributed to the remaining Other projects listed in the table.

Subtotals have been rounded.



I-69 EVANSVILLE TO INDIANAPOLIS TIER 2 STUDIES

Section 5—Draft Environmental Impact Statement

Table 5.24-9D: Alternative 7: Summary of Cumulative Land Use Changes to Upland Forest

Land Use Changes as a result of	Tier 2 I-69 Section 5 - Alternative 7			"Other" Projects				Cumulative Impacts
	I-69 Tier 2 Section 5 In Monroe County (Column A)	I-69 Tier 2 Section 5 In Morgan County (Column B)	Total I-69 Tier 2 Section 5 (Column C = A+B)	I-69 - Tier 2 Section 4 In Monroe County (Column D)	I-69 - Tier 2 Section 6 Worst Case In Morgan County (Column E)	"Other" Projected Growth in Monroe and Morgan County (Column F)	Total "Other" Projects (Column G = D+E+F)	Total I-69 Tier 2 Section 5 and Total "Other" Projects (Column H = C + G)
Direct Conversion of Upland Forest Land (Acres)	-188	-45	-233	-335	-209	-3,244	-3,788	-4,021
Indirect / Induced Conversion of Upland Forest Land (Acres)	-31	-16	-47	Not Applicable	Not Applicable	Not Applicable	Not Applicable	-47
Mitigation	188	45	233	Not Applicable	Not Applicable	Not Applicable	Not Applicable	233
TOTALS	-31	-16	-47	-335	-209	-3,244	-3,788	-3,835

Notes:

Section 4 impacts (within Section 5's geographic scope) are based on design right-of-way as of August 22, 2012 and may differ from July 2011 FEIS.

Section 6 impacts (within Section 5's geographic scope) are based on the Tier 1 BA Addendum Representative Alignment. The representative alignment was defined as "the footprint for the alternative with the largest Tier 2 forest impacts, among those alternatives that were still under study as of November 14, 2005."

Other Projected Growth is the growth expected in the Section 5 geographic scope that is expected to occur even if I-69 is not constructed (the No Build scenario) and which is not attributed to the remaining Other projects listed in the table.

Subtotals have been rounded.

Section 5—Draft Environmental Impact Statement
Table 5.24-9E: Alternative 8: Summary of Cumulative Land Use Changes to Upland Forest

Land Use Changes as a result of	Tier 2 I-69 Section 5 - Alternative 8			"Other" Projects				Cumulative Impacts
	I-69 Tier 2 Section 5 In Monroe County (Column A)	I-69 Tier 2 Section 5 In Morgan County (Column B)	Total I-69 Tier 2 Section 5 (Column C = A+B)	I-69 - Tier 2 Section 4 In Monroe County (Column D)	I-69 - Tier 2 Section 6 Worst Case In Morgan County (Column E)	"Other" Projected Growth in Monroe and Morgan County (Column F)	Total "Other" Projects (Column G = D+E+F)	Total I-69 Tier 2 Section 5 and Total "Other" Projects (Column H = C + G)
Direct Conversion of Upland Forest Land (Acres)	-204	-45	-249	-335	-209	-3,244	-3,788	-4,037
Indirect / Induced Conversion of Upland Forest Land (Acres)	-31	-16	-47	Not Applicable	Not Applicable	Not Applicable	Not Applicable	-47
Mitigation	204	45	249	Not Applicable	Not Applicable	Not Applicable	Not Applicable	249
TOTALS	-31	-16	-47	-335	-209	-3,244	-3,788	-3,835

Notes:

Section 4 impacts (within Section 5's geographic scope) are based on design right-of-way as of August 22, 2012 and may differ from July 2011 FEIS.

Section 6 impacts (within Section 5's geographic scope) are based on the Tier 1 BA Addendum Representative Alignment. The representative alignment was defined as "the footprint for the alternative with the largest Tier 2 forest impacts, among those alternatives that were still under study as of November 14, 2005."

Other Projected Growth is the growth expected in the Section 5 geographic scope that is expected to occur even if I-69 is not constructed (the No Build scenario) and which is not attributed to the remaining Other projects listed in the table.

Subtotals have been rounded.



I-69 EVANSVILLE TO INDIANAPOLIS TIER 2 STUDIES

Section 5—Draft Environmental Impact Statement

Table 5.24-9F: Refined Preferred Alternative 8: Summary of Cumulative Land Use Changes to Upland Forest

Land Use Changes as a result of	Tier 2 I-69 Section 5 - Refined Preferred Alternative 8			"Other" Projects				Cumulative Impacts
	I-69 Tier 2 Section 5 In Monroe County (Column A)	I-69 Tier 2 Section 5 In Morgan County (Column B)	Total I-69 Tier 2 Section 5 (Column C = A+B)	I-69 - Tier 2 Section 4 In Monroe County (Column D)	I-69 - Tier 2 Section 6 Worst Case In Morgan County (Column E)	"Other" Projected Growth in Monroe and Morgan County (Column F)	Total "Other" Projects (Column G = D+E+F)	Total I-69 Tier 2 Section 5 and Total "Other" Projects (Column H = C + G)
Direct Conversion of Upland Forest Land (Acres)	-187	-41	-228	-335	-209	-3,244	-3,788	-4,016
Indirect / Induced Conversion of Upland Forest Land (Acres)	-31	-16	-47	Not Applicable	Not Applicable	Not Applicable	Not Applicable	-47
Mitigation	187	41	228	Not Applicable	Not Applicable	Not Applicable	Not Applicable	228
TOTALS	-31	-16	-47	-335	-209	-3,244	-3,788	-3,835

Notes:

Section 4 impacts (within Section 5's geographic scope) are based on design right-of-way as of August 22, 2012 and may differ from July 2011 FEIS.

Section 6 impacts (within Section 5's geographic scope) are based on the Tier 1 BA Addendum Representative Alignment. The representative alignment was defined as "the footprint for the alternative with the largest Tier 2 forest impacts, among those alternatives that were still under study as of November 14, 2005."

Other Projected Growth is the growth expected in the Section 5 geographic scope that is expected to occur even if I-69 is not constructed (the No Build scenario) and which is not attributed to the remaining Other projects listed in the table.

Subtotals have been rounded.

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Section 5.24 Figure Index

(Figures follow this index unless otherwise noted.)

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Figure 5.24-2: Land in Farms-Monroe and Morgan Counties-History and Trends	(p. 5.24-24)
Figure 5.24-3: Land in Forest-Monroe and Morgan Counties	(p. 5.24-25)
Figure 5.24-4A: Indirect Land Use Changes 2035 Projected Growth Alternative 4	1
Figure 5.24-4B: Indirect Land Use Changes 2035 Projected Growth Alternatives 5, 7, DEIS Preferred Alternative 8, and Refined Preferred Alternative 8	1
Figure 5.24-4C: Indirect Land Use Changes 2035 Projected Growth Alternative 6	1
Figure 5.24-5A: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Soil Septic Absorption - Alternative 4	4
Figure 5.24-5B: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 & Soil Septic Absorption - Alternative 5, 7, DEIS Preferred Alternative 8 & Refined Preferred 8	4
Figure 5.24-5C: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Soil Septic Absorption - Alternative 6	4
Figure 5.24-6A: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Environmental Features - Alternative 4	4
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Figure 5.24-6C: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Environmental Features - Alternative 6	4
Figure 5.24-7A: Bloomington Existing Sanitary Sewer System and Karst Features - Alternative 4	1
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Figure 5.24-7C: Bloomington Existing Sanitary Sewer System and Karst Features - Alternative 6	1

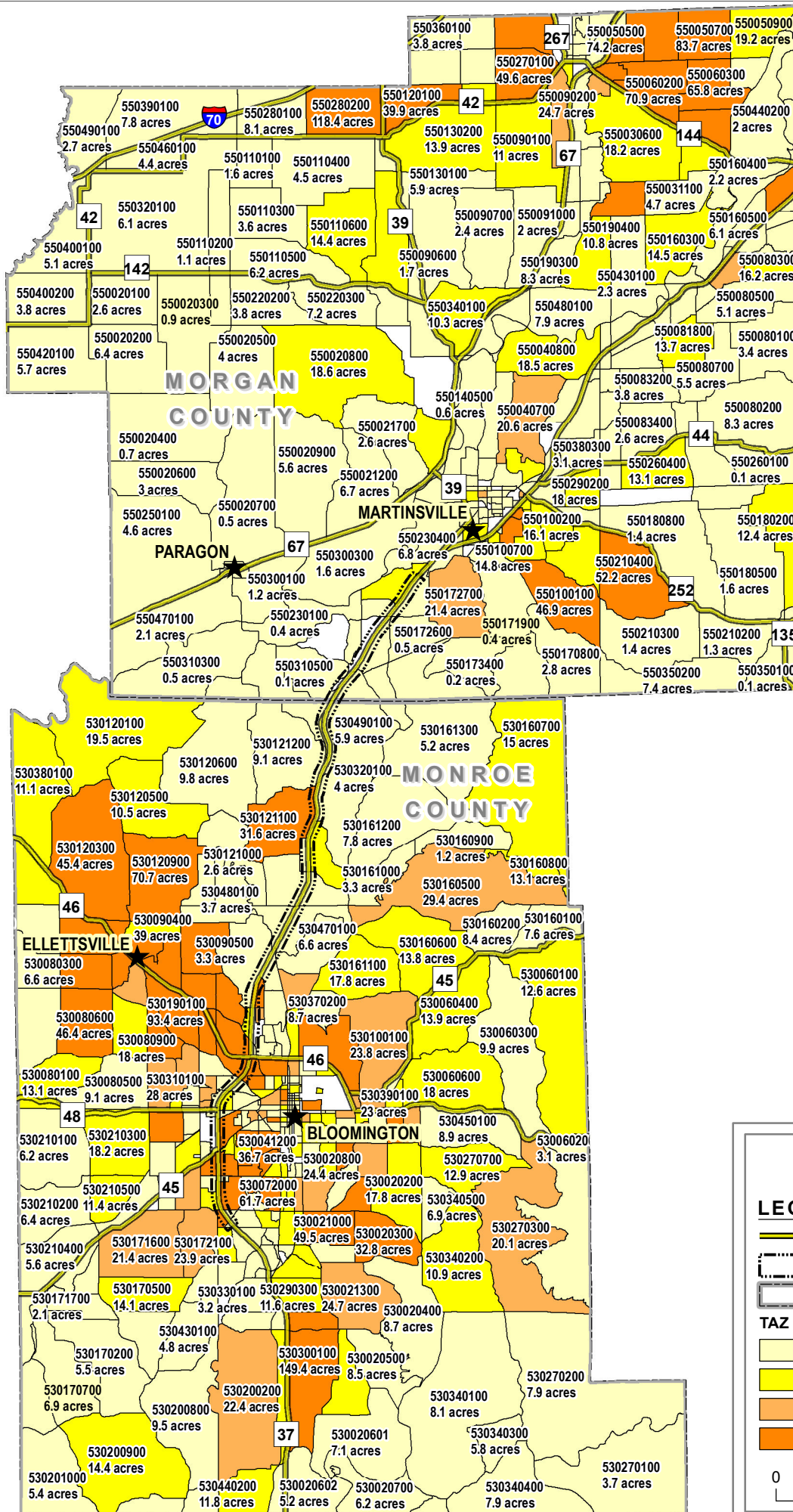


Figure 5.24-1: Land Use Changes
2035 No Build Growth

LEGEND

- Primary Roads
- 2,000-foot Corridor
- County

TAZ Boundary with No Build Growth 2035

- 0.1 - 10.0 acres
- 10.1 - 20.0 acres
- 20.1 - 30.0 acres
- Over 30.1 acres

0 1 2 3 4 5 6 7 mi



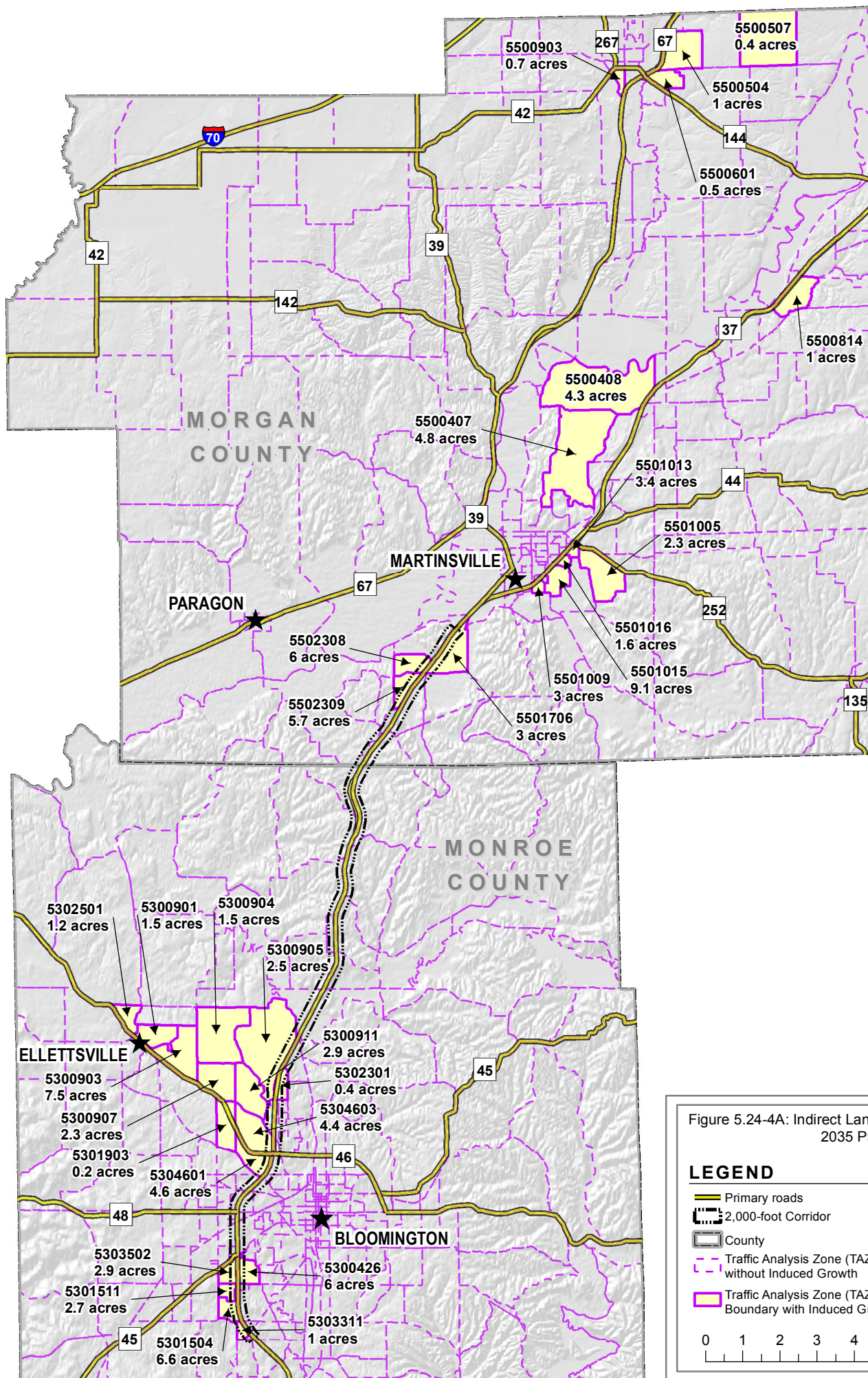


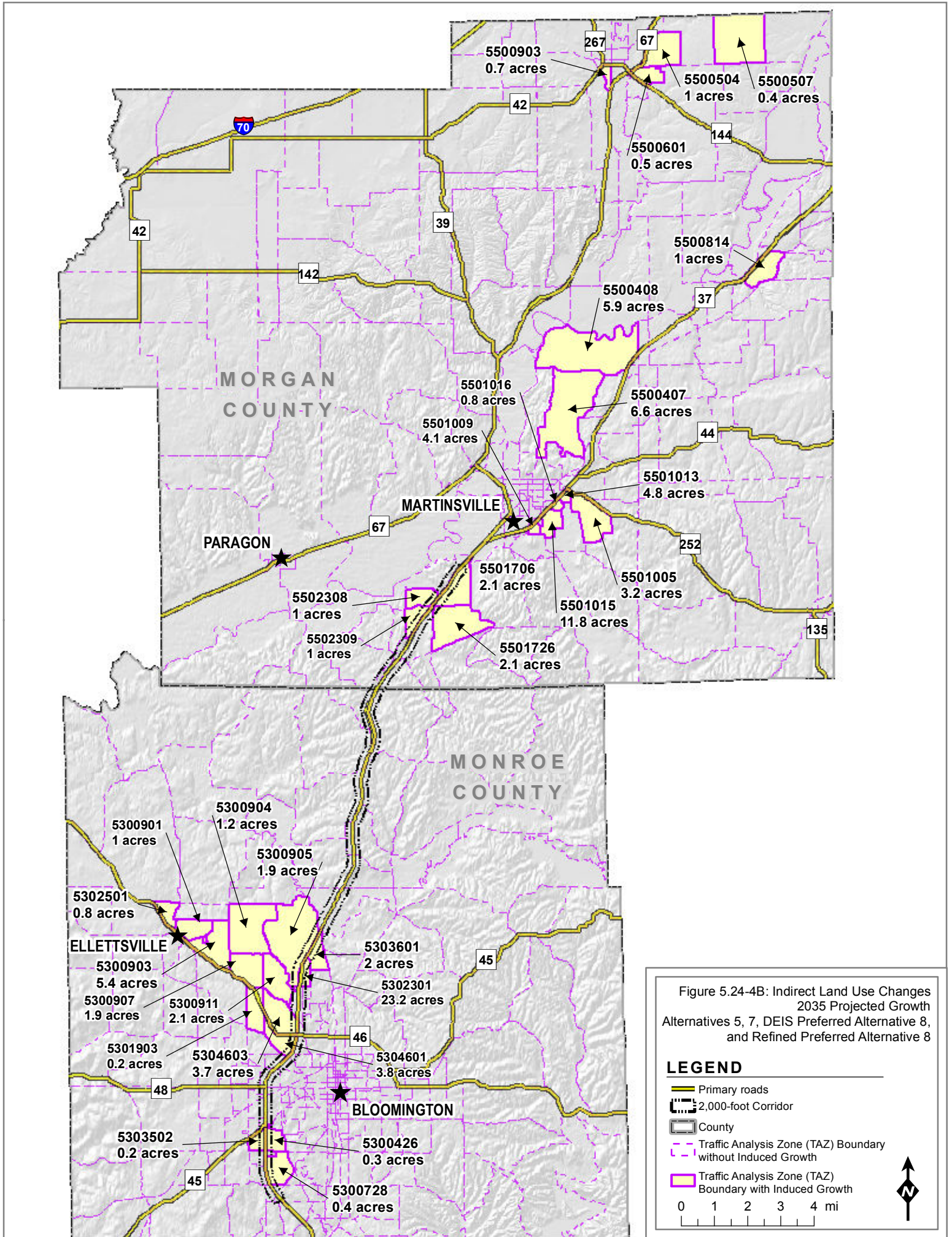
Figure 5.24-4A: Indirect Land Use Changes
2035 Projected Growth
Alternative 4

LEGEND

- Primary roads
- 2,000-foot Corridor
- County
- Traffic Analysis Zone (TAZ) Boundary without Induced Growth
- Traffic Analysis Zone (TAZ) Boundary with Induced Growth

0 1 2 3 4 5 mi





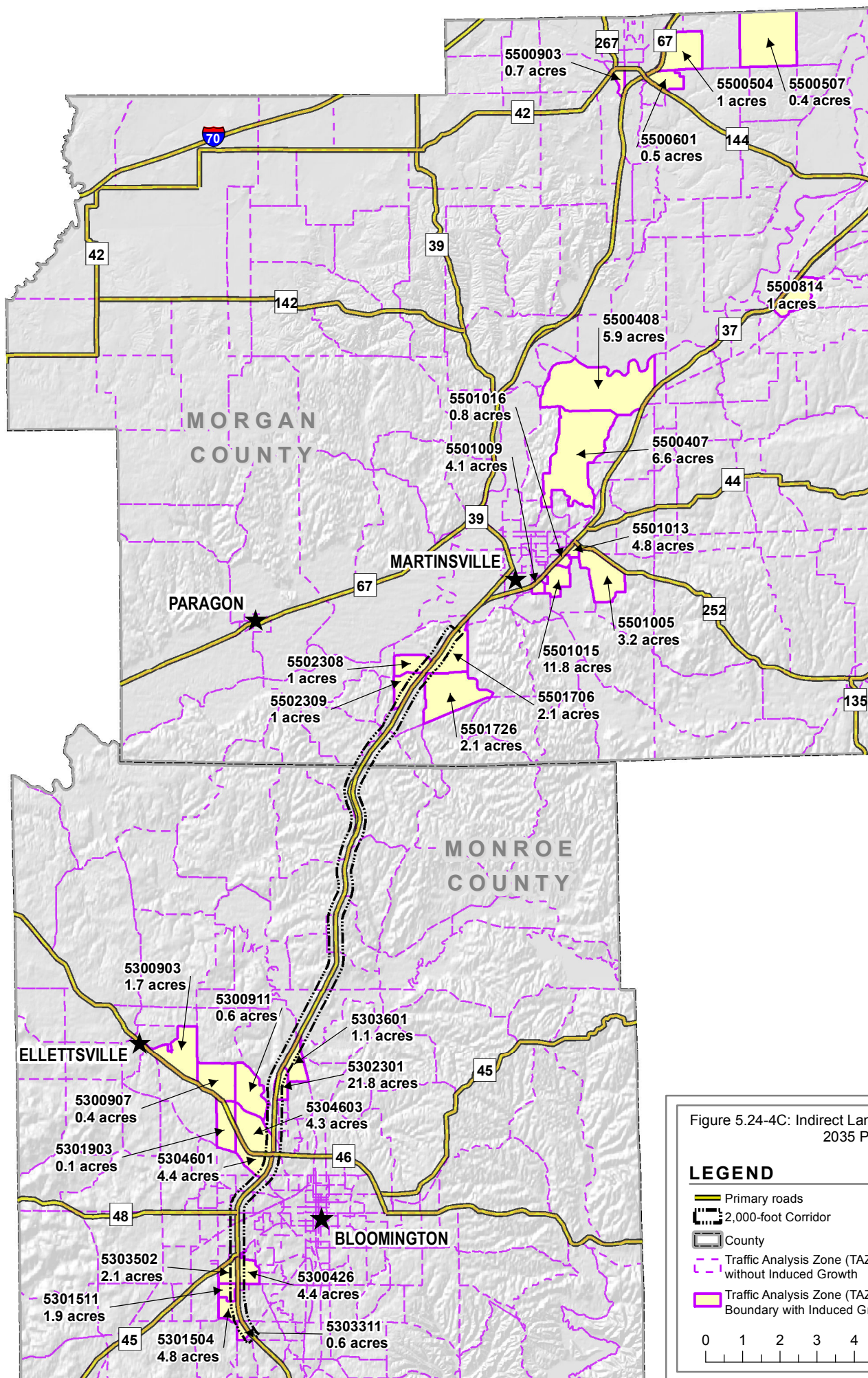


Figure 5.24-4C: Indirect Land Use Changes
2035 Projected Growth
Alternative 6

LEGEND

- Primary roads
- 2,000-foot Corridor
- County
- Traffic Analysis Zone (TAZ) Boundary without Induced Growth
- Traffic Analysis Zone (TAZ) Boundary with Induced Growth

0 1 2 3 4 5 mi



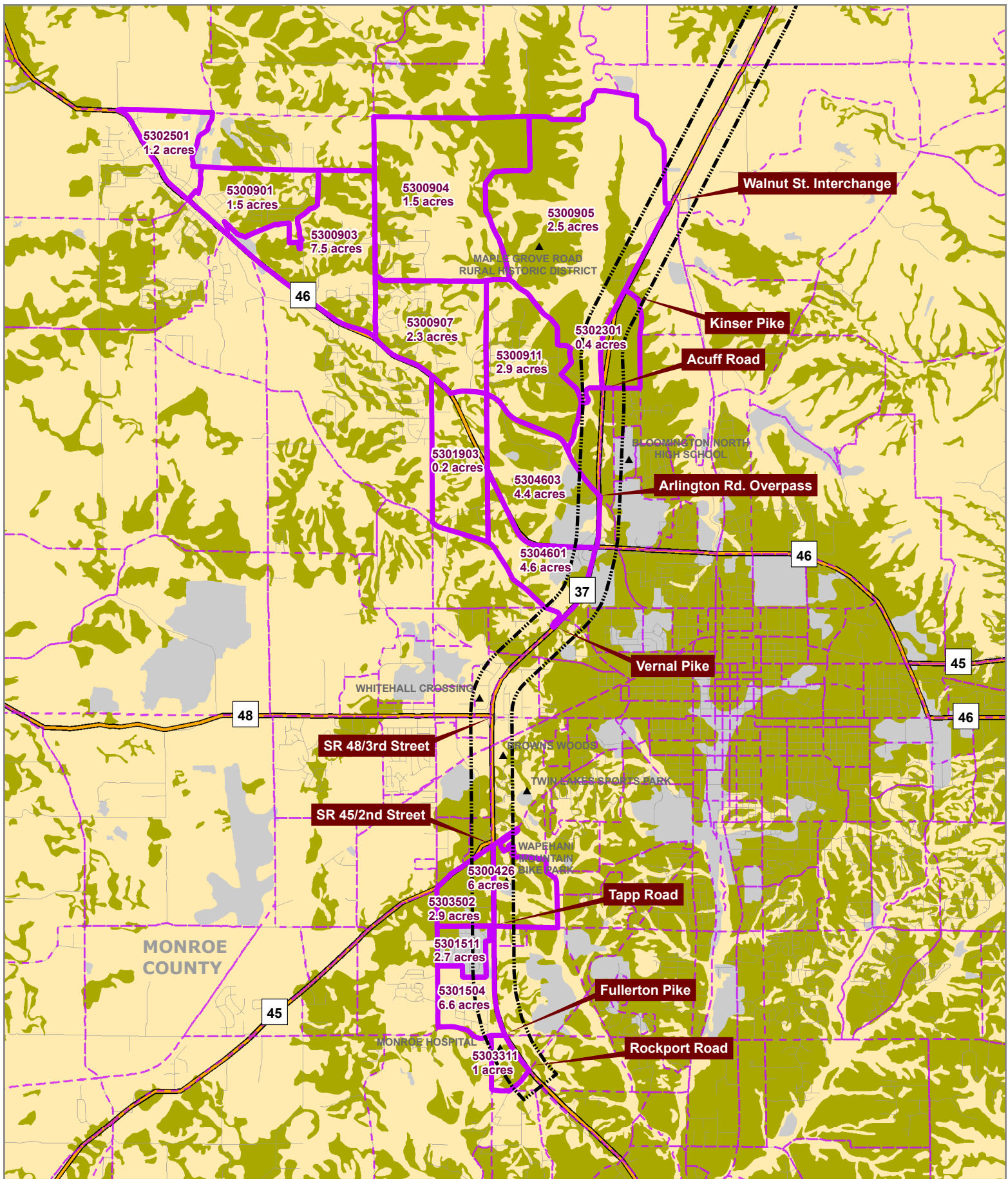


Figure 5.24-5A: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Soil Septic Absorption - Alternative 4



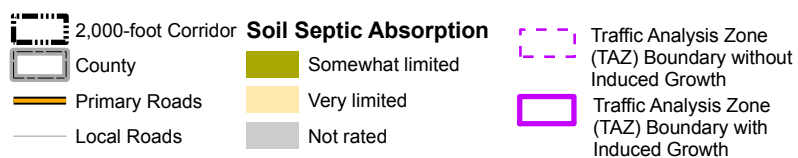
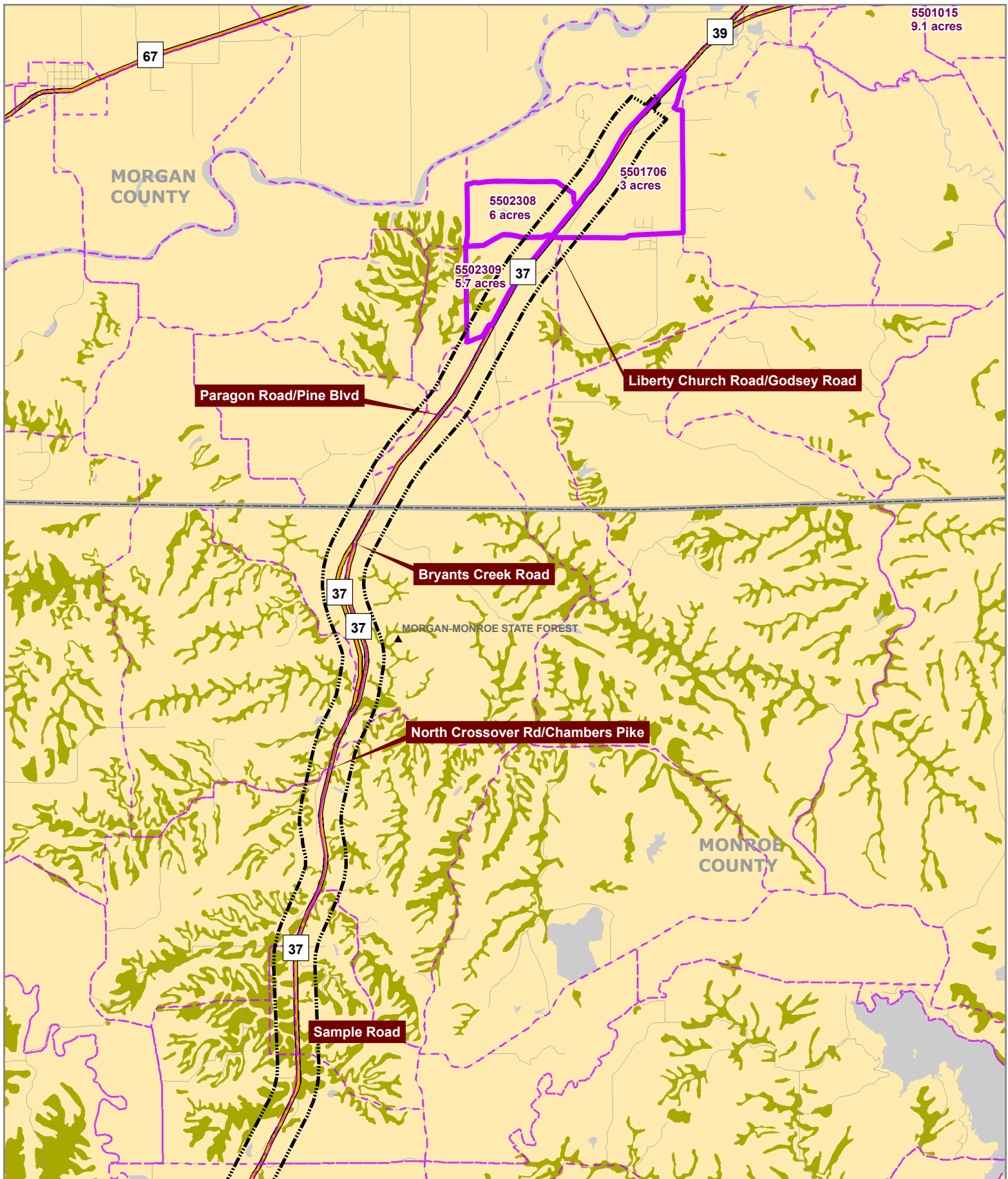


Figure 5.24-5A: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Soil Septic Absorption - Alternative 4



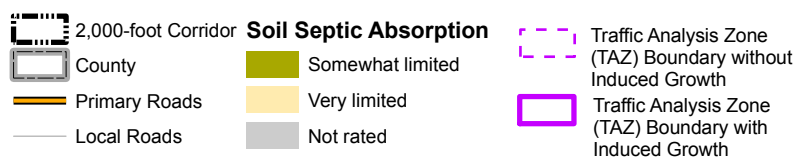
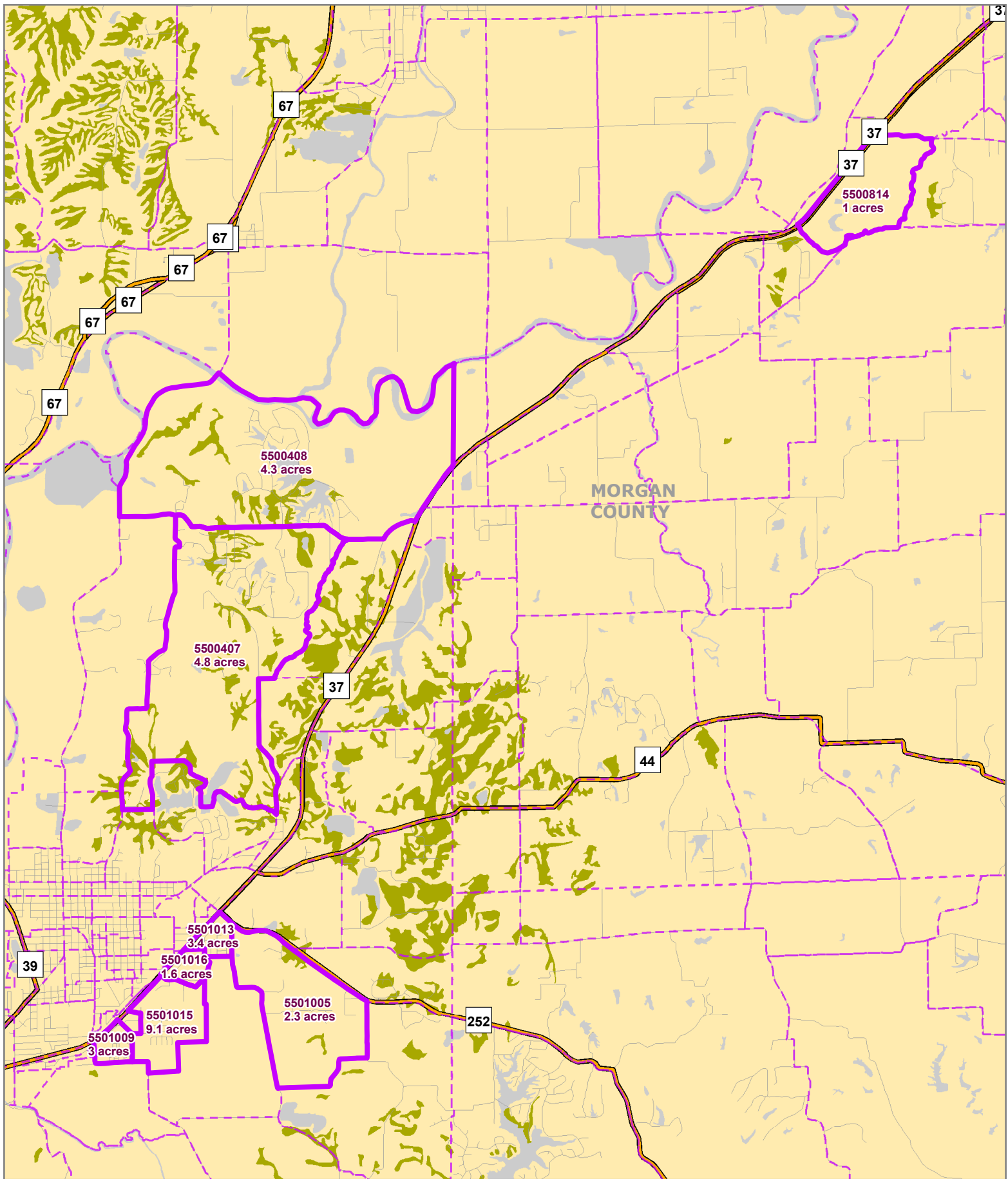
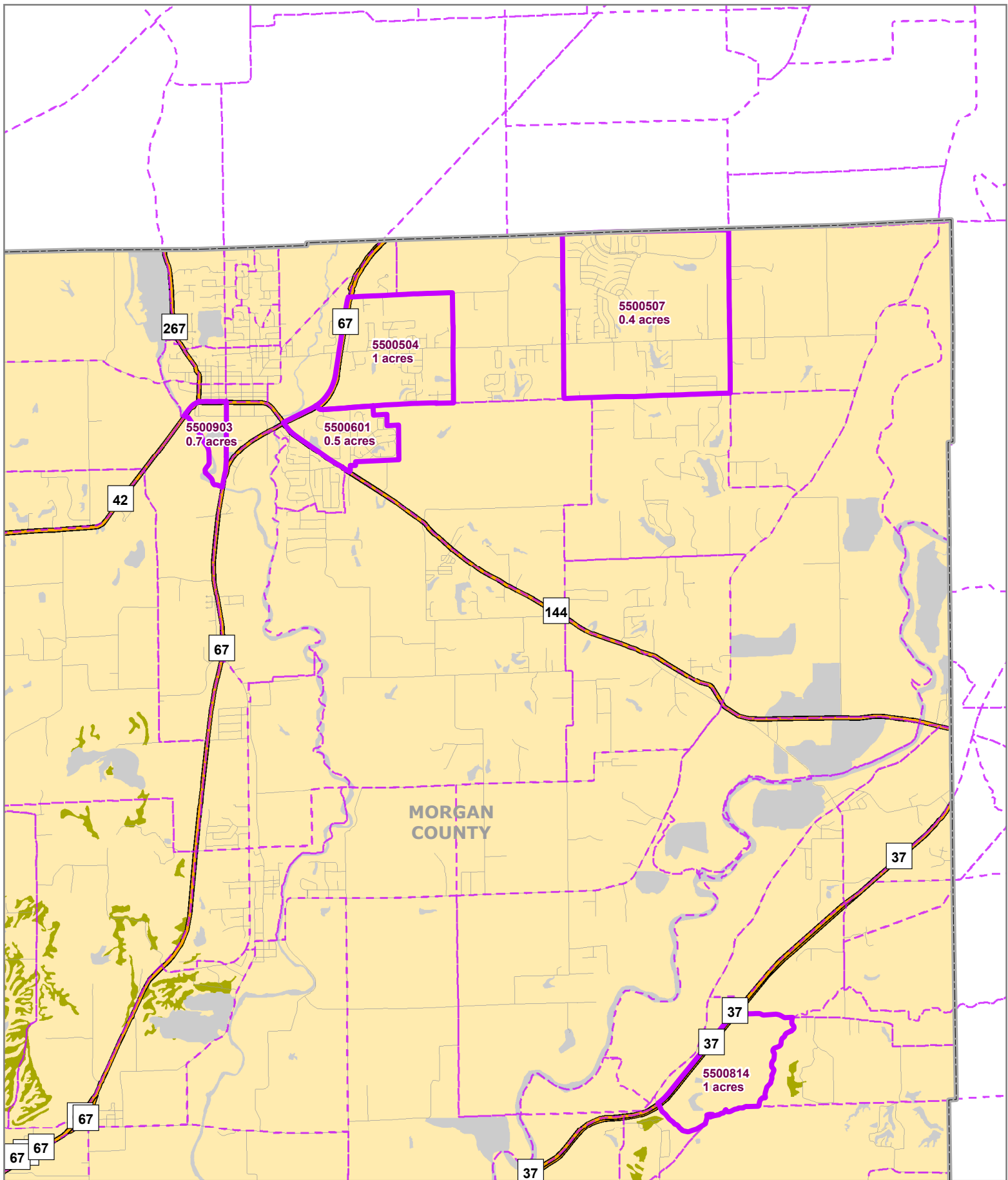


Figure 5.24-5A: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Soil Septic Absorption - Alternative 4





- 2,000-foot Corridor
 - County
 - Primary Roads
 - Local Roads
- Soil Septic Absorption**
- Somewhat limited
 - Very limited
 - Not rated

- Traffic Analysis Zone (TAZ) Boundary without Induced Growth
- Traffic Analysis Zone (TAZ) Boundary with Induced Growth

Figure 5.24-5A: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Soil Septic Absorption - Alternative 4



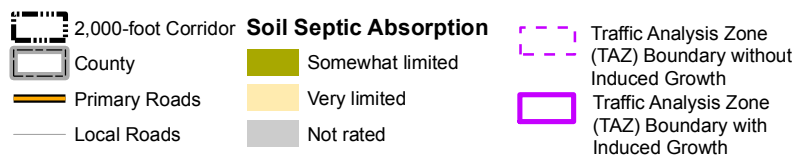
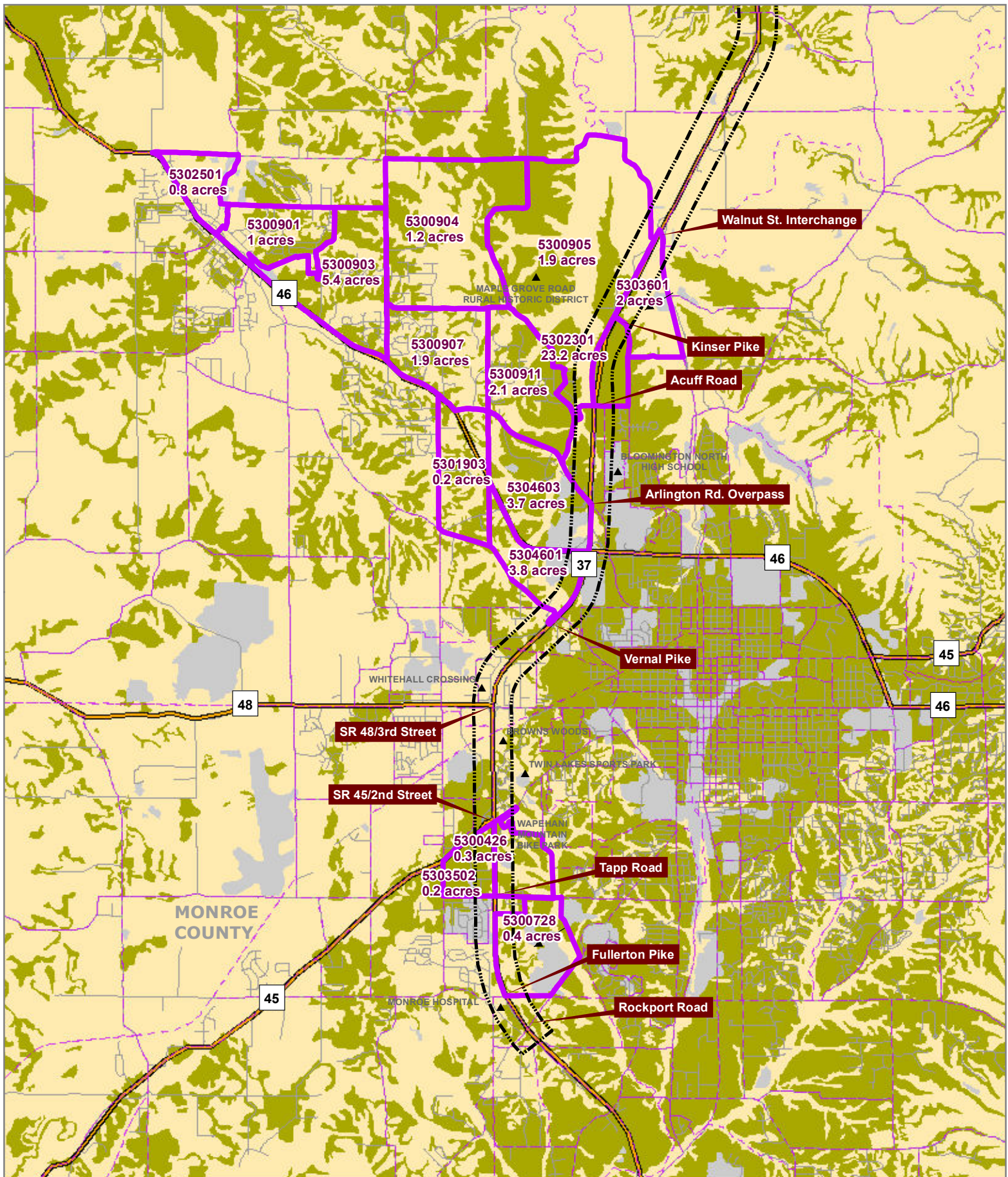


Figure 5.24-5B: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Soil Septic Absorption - Alternative 5, 7, DEIS Preferred Alternative 8 & Refined Preferred Alternative 8



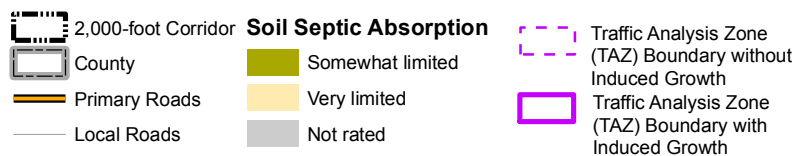
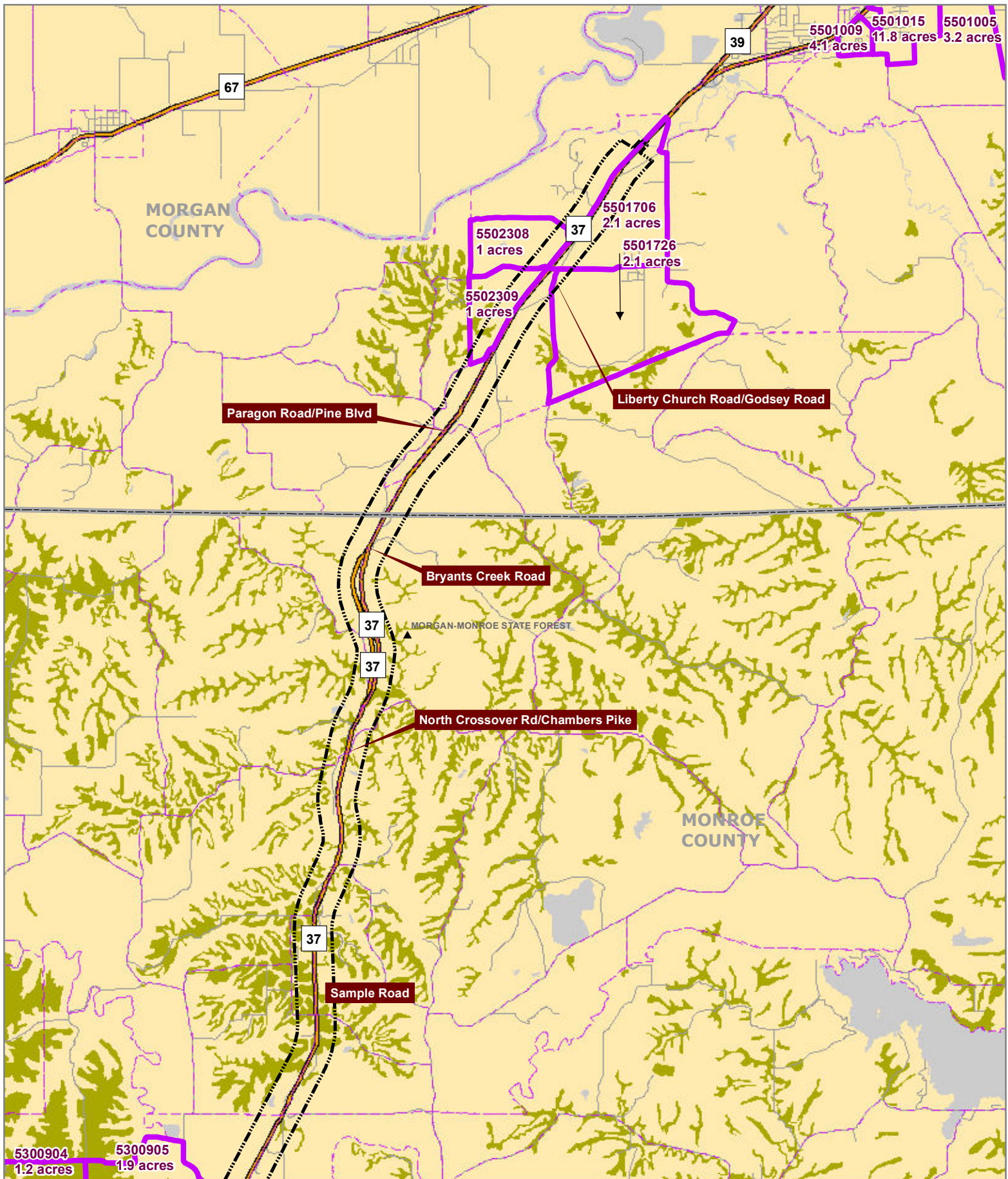


Figure 5.24-5B: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Soil Septic Absorption - Alternative 5, 7, DEIS Preferred Alternative 8 & Refined Preferred Alternative 8



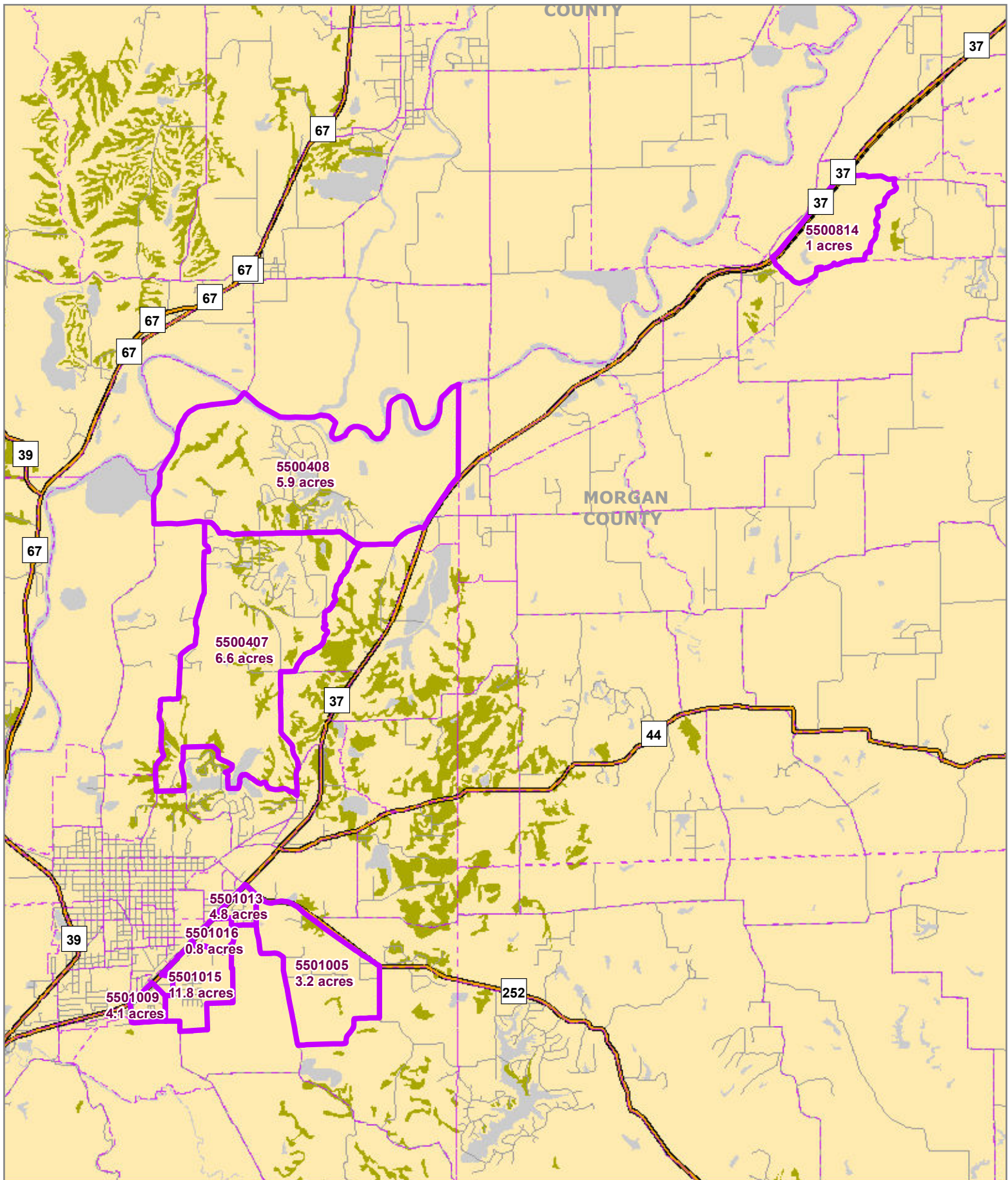


Figure 5.24-5B: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Soil Septic Absorption - Alternative 5, 7, DEIS Preferred Alternative 8 & Refined Preferred Alternative 8



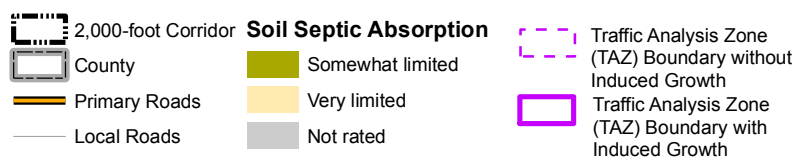
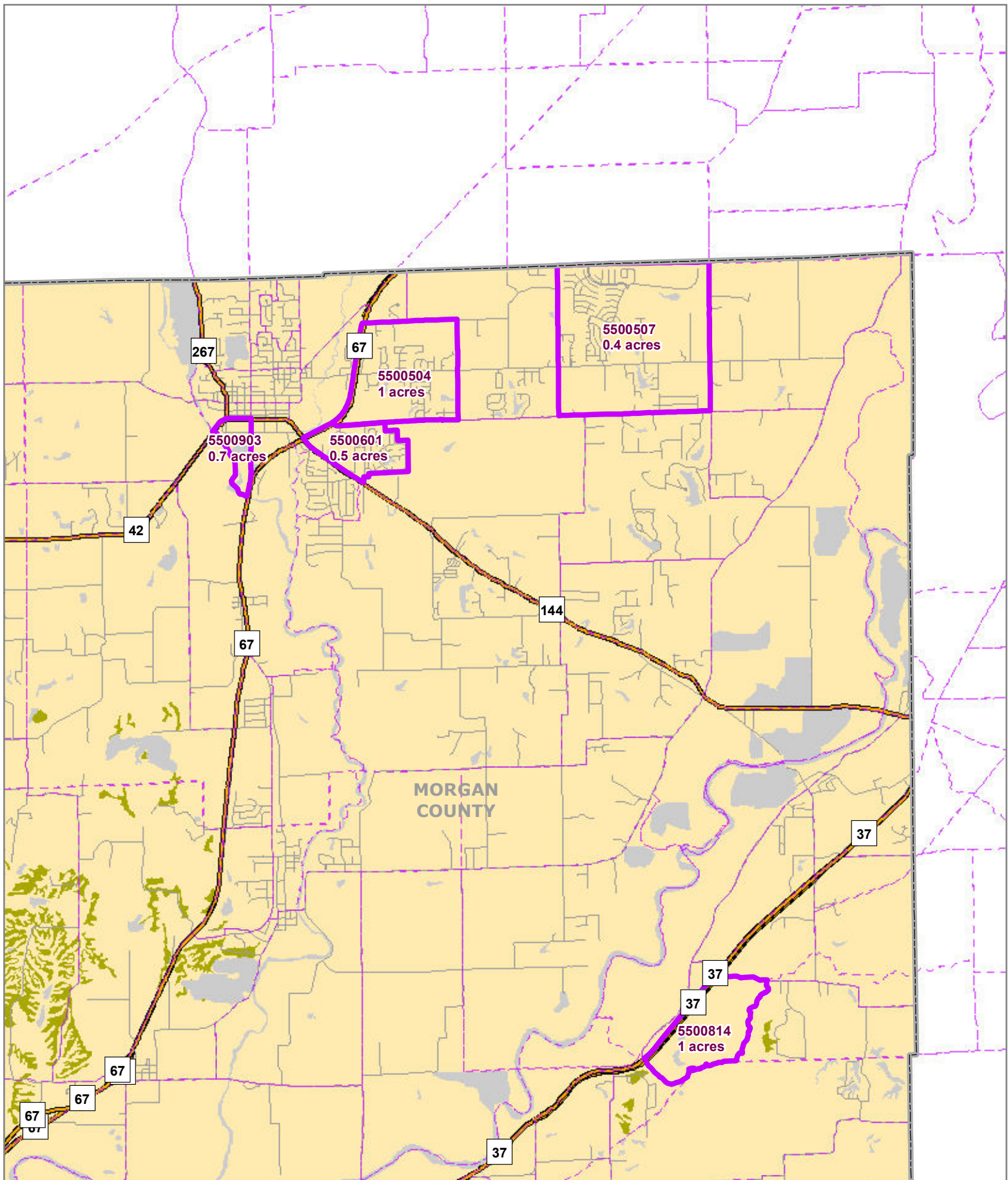


Figure 5.24-5B: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Soil Septic Absorption - Alternative 5, 7, DEIS Preferred Alternative 8 & Refined Preferred Alternative 8



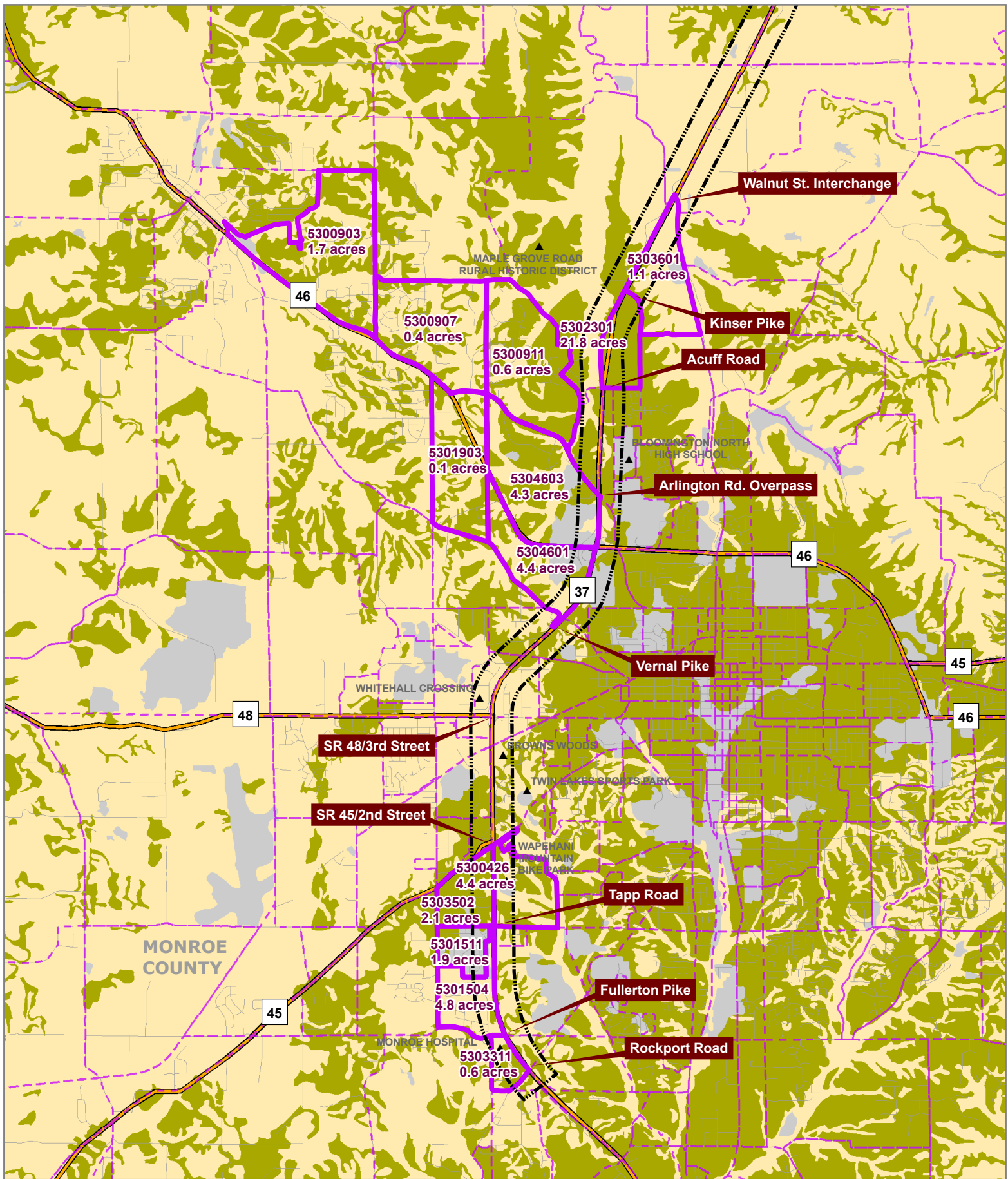


Figure 5.24-5C: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Soil Septic Absorption - Alternative 6



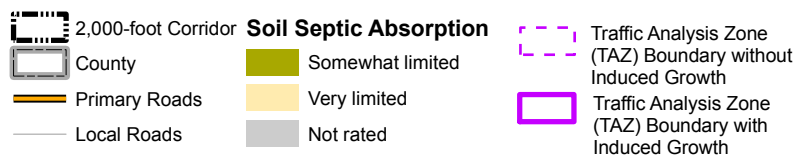
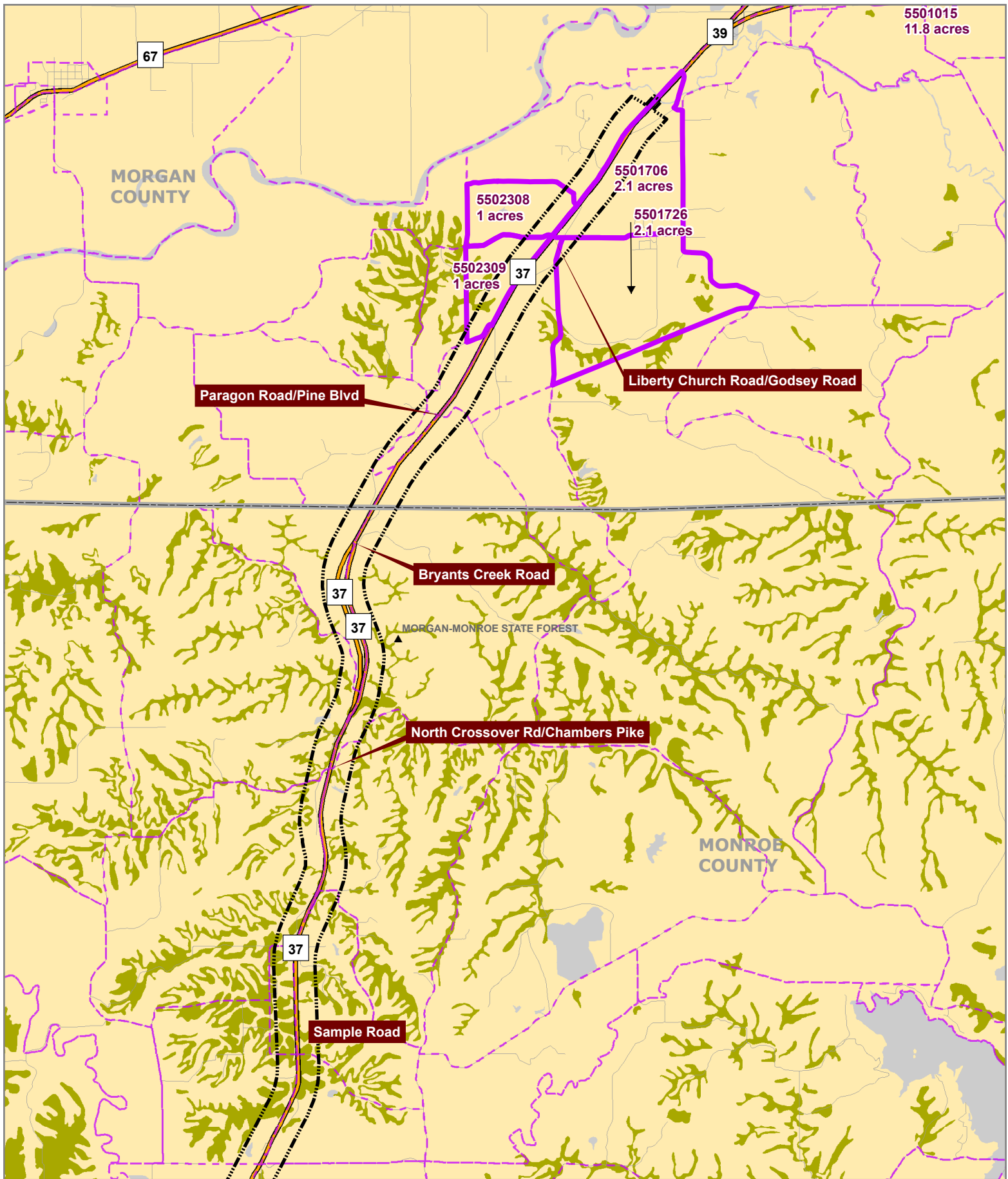


Figure 5.24-5C: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Soil Septic Absorption - Alternative 6



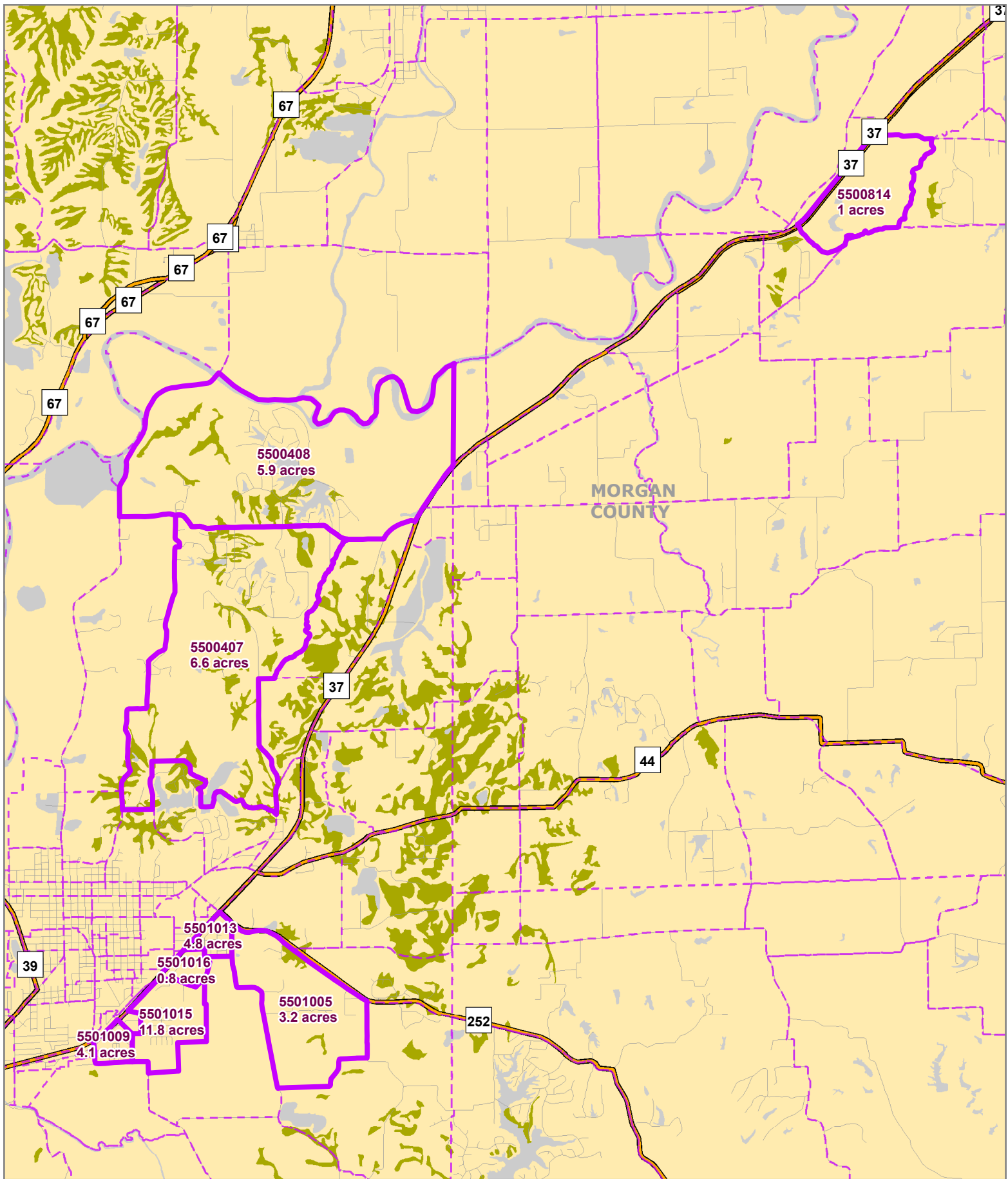


Figure 5.24-5C: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Soil Septic Absorption - Alternative 6



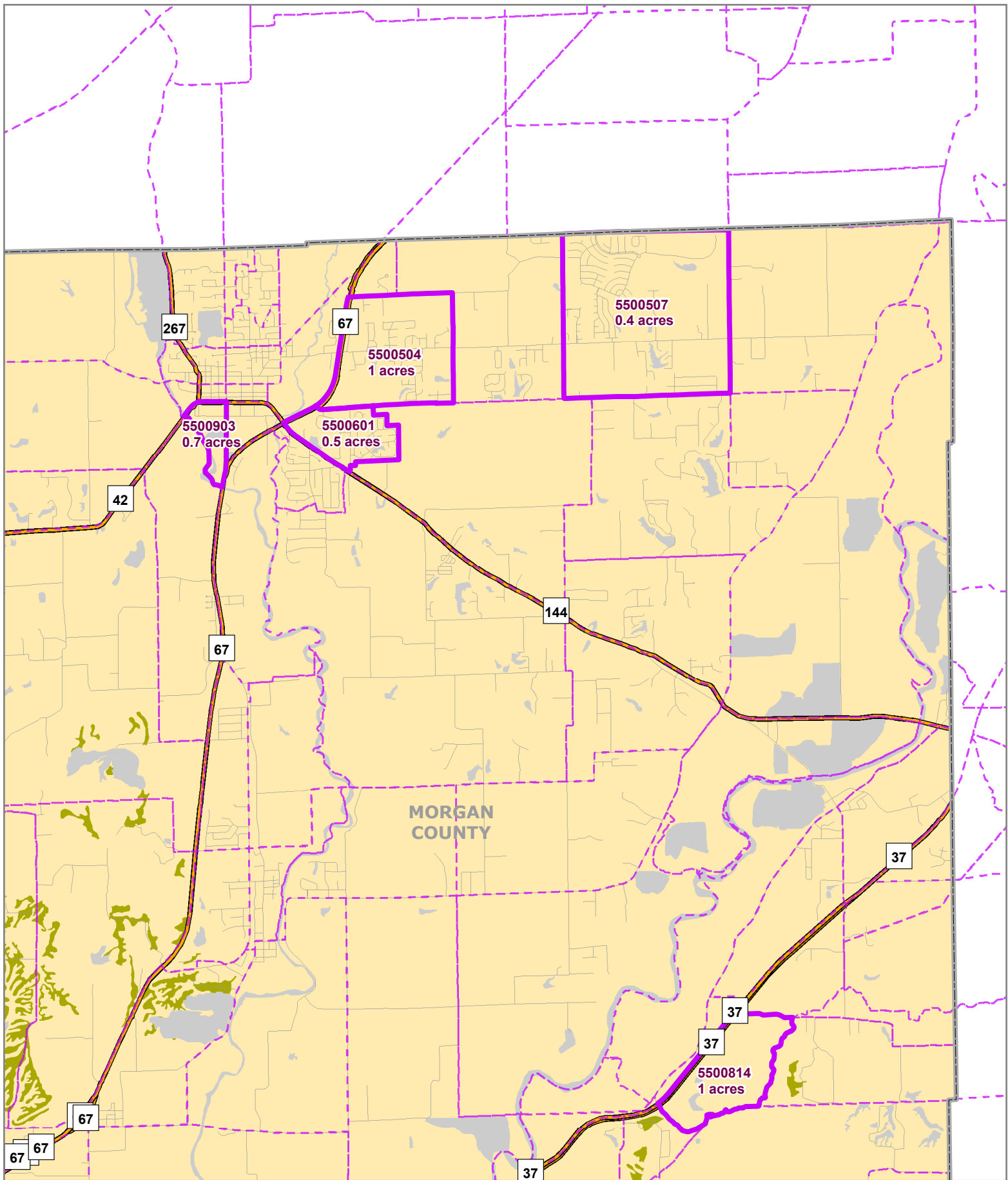


Figure 5.24-5C: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Soil Septic Absorption - Alternative 6



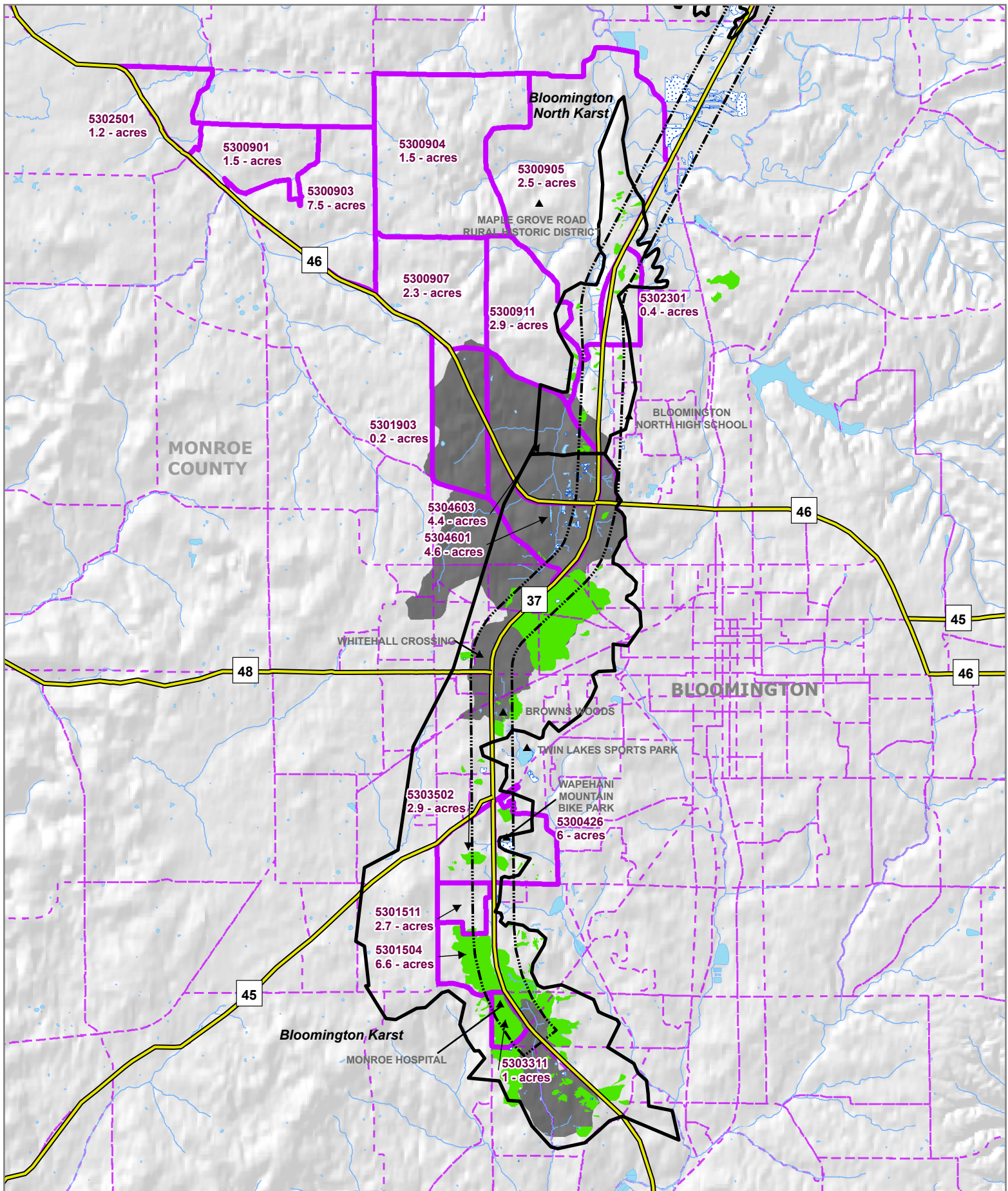


Figure 5.24-6A: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Environmental Features - Alternative 4

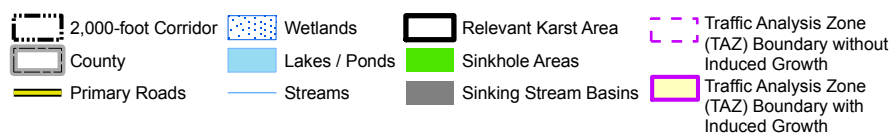
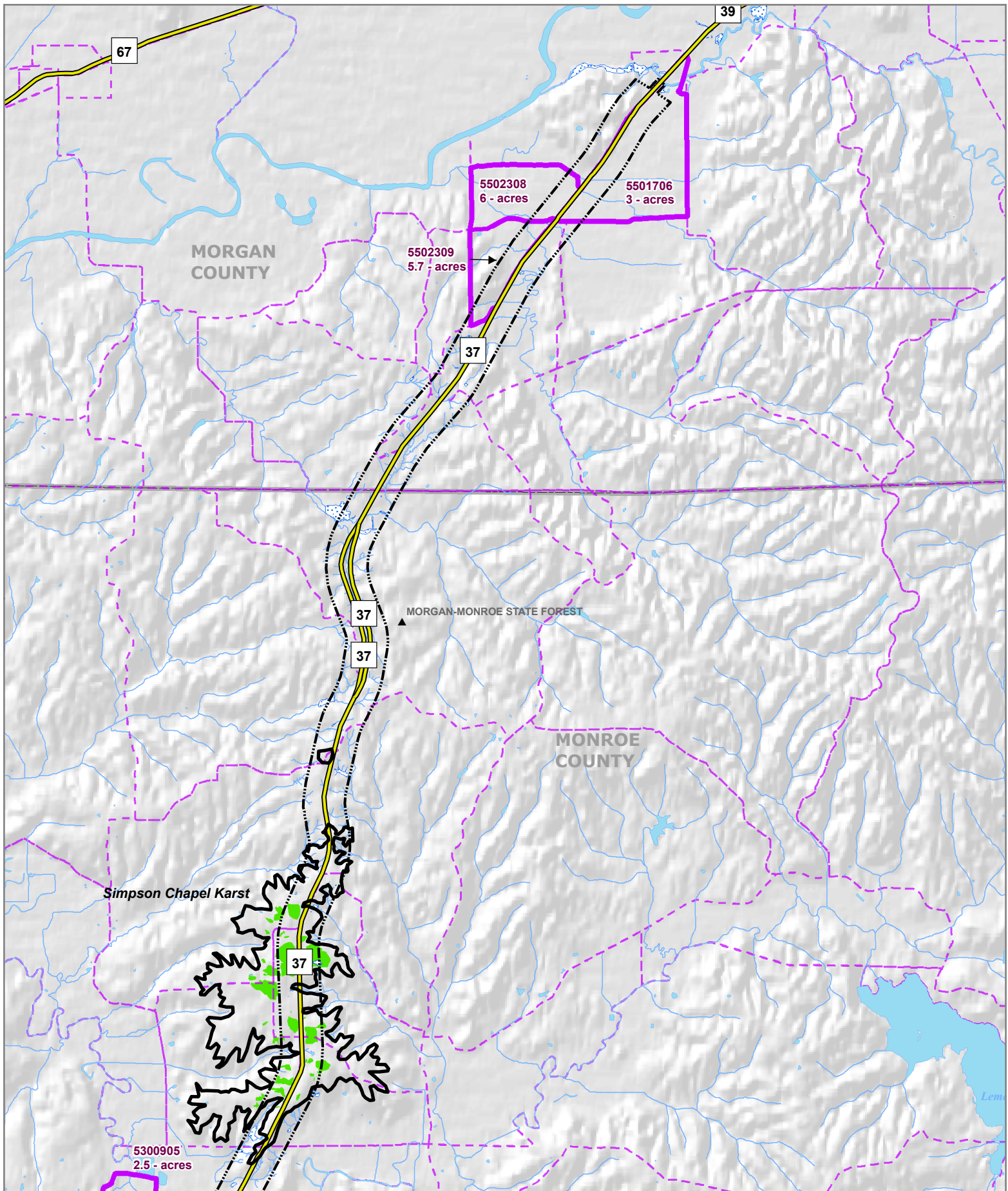
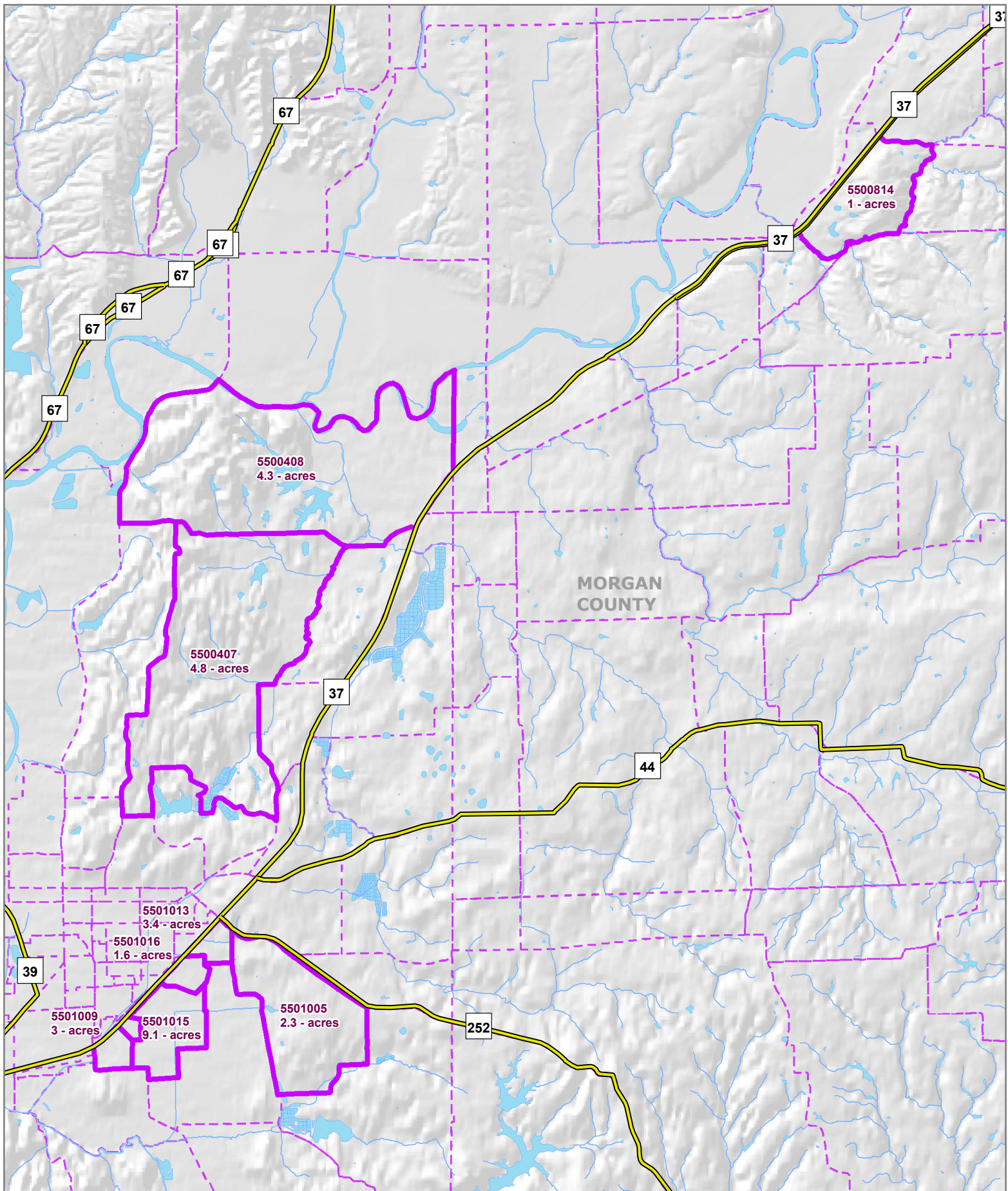


Figure 5.24-6A: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Environmental Features - Alternative 4





- | | | | |
|---------------------|---------------|-----------------------|---|
| 2,000-foot Corridor | Wetlands | Relevant Karst Area | Traffic Analysis Zone (TAZ) Boundary without Induced Growth |
| County | Lakes / Ponds | Sinkhole Areas | Traffic Analysis Zone (TAZ) Boundary with Induced Growth |
| Primary Roads | Streams | Sinking Stream Basins | |

Figure 5.24-6A: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Environmental Features - Alternative 4



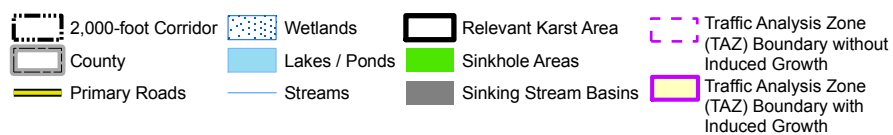
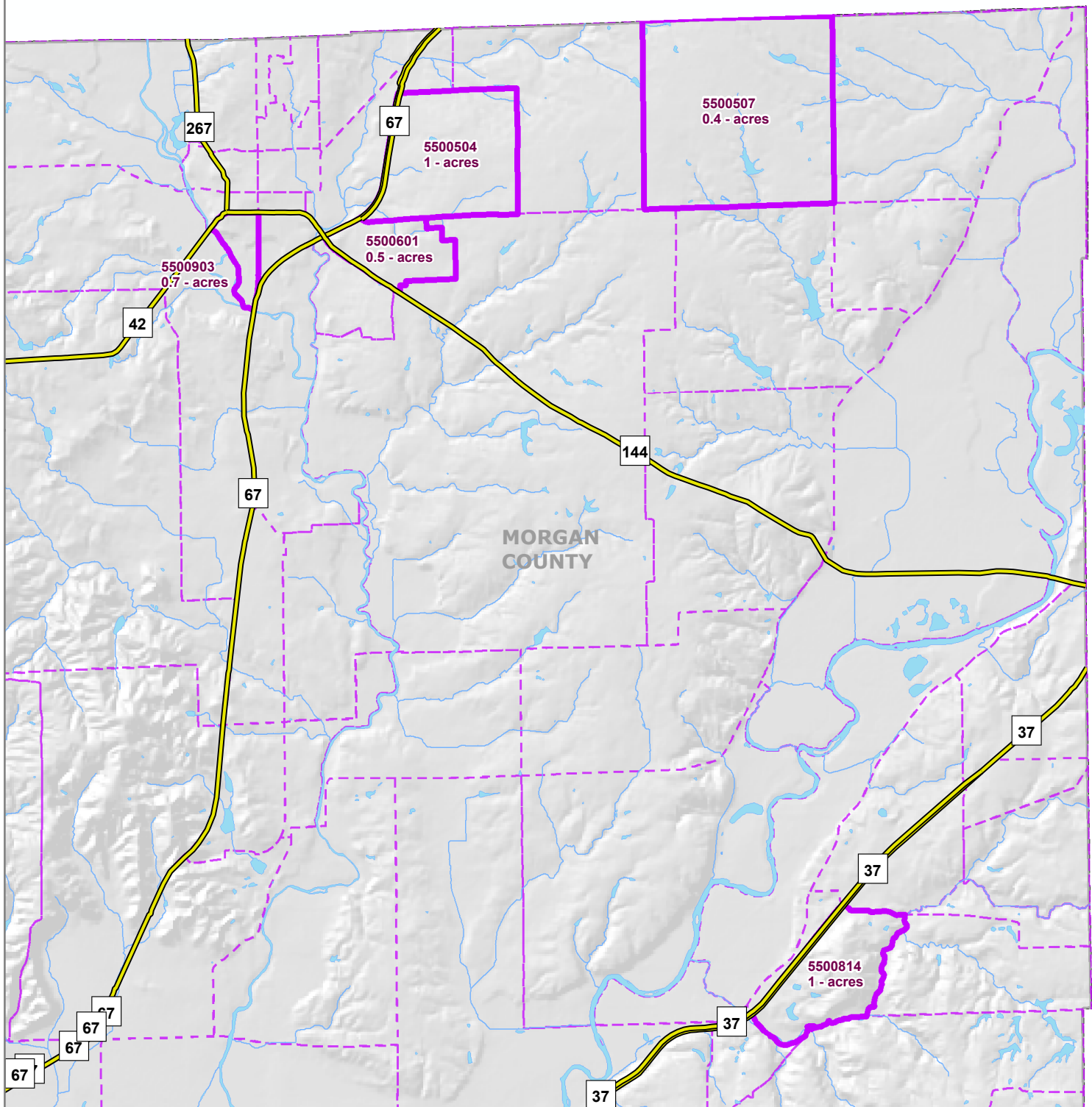


Figure 5.24-6A: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Environmental Features - Alternative 4



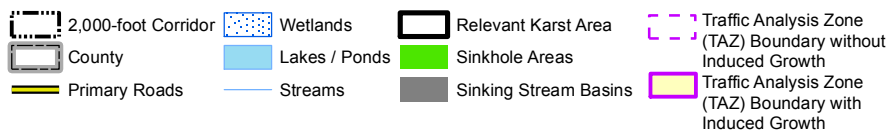
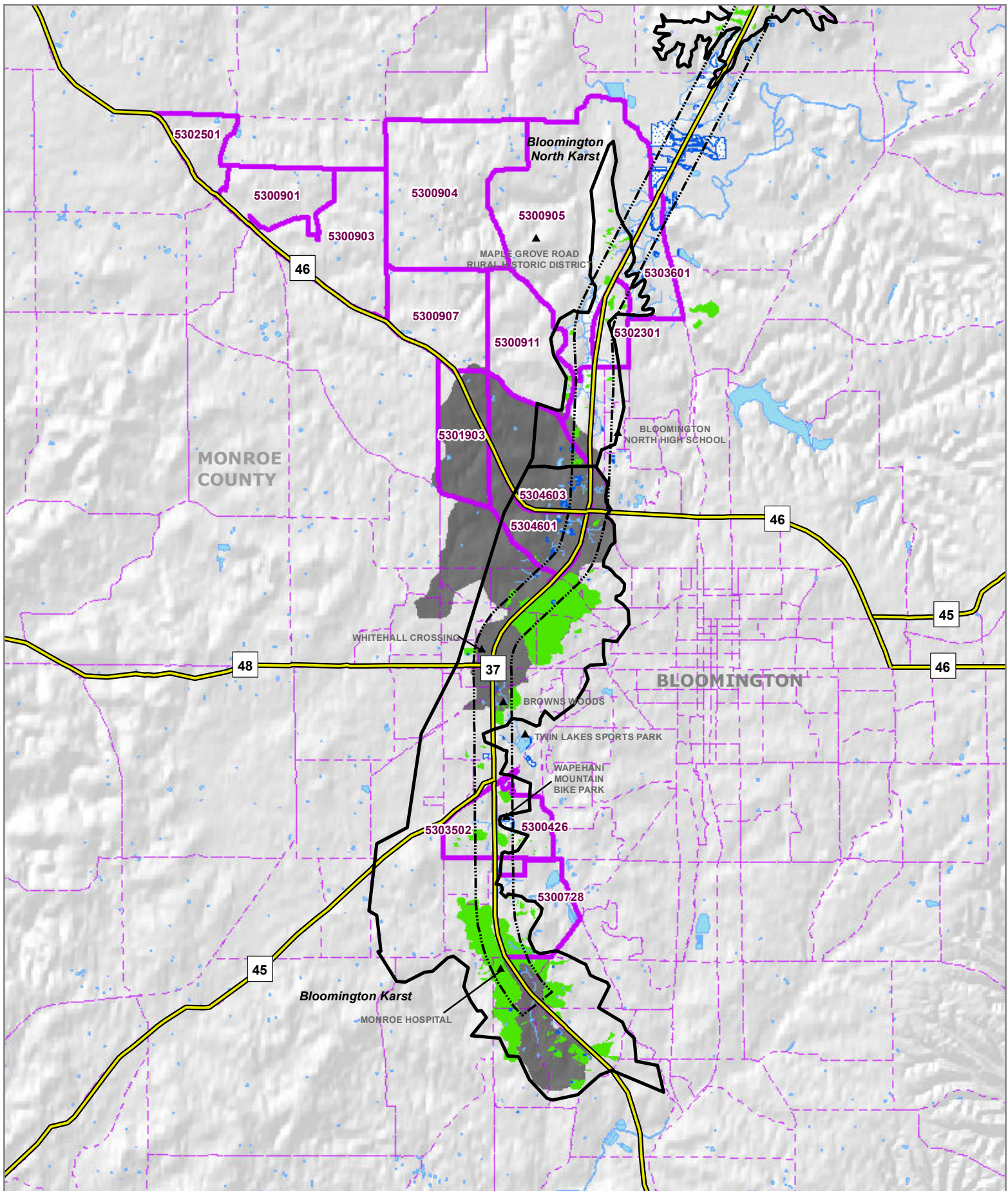
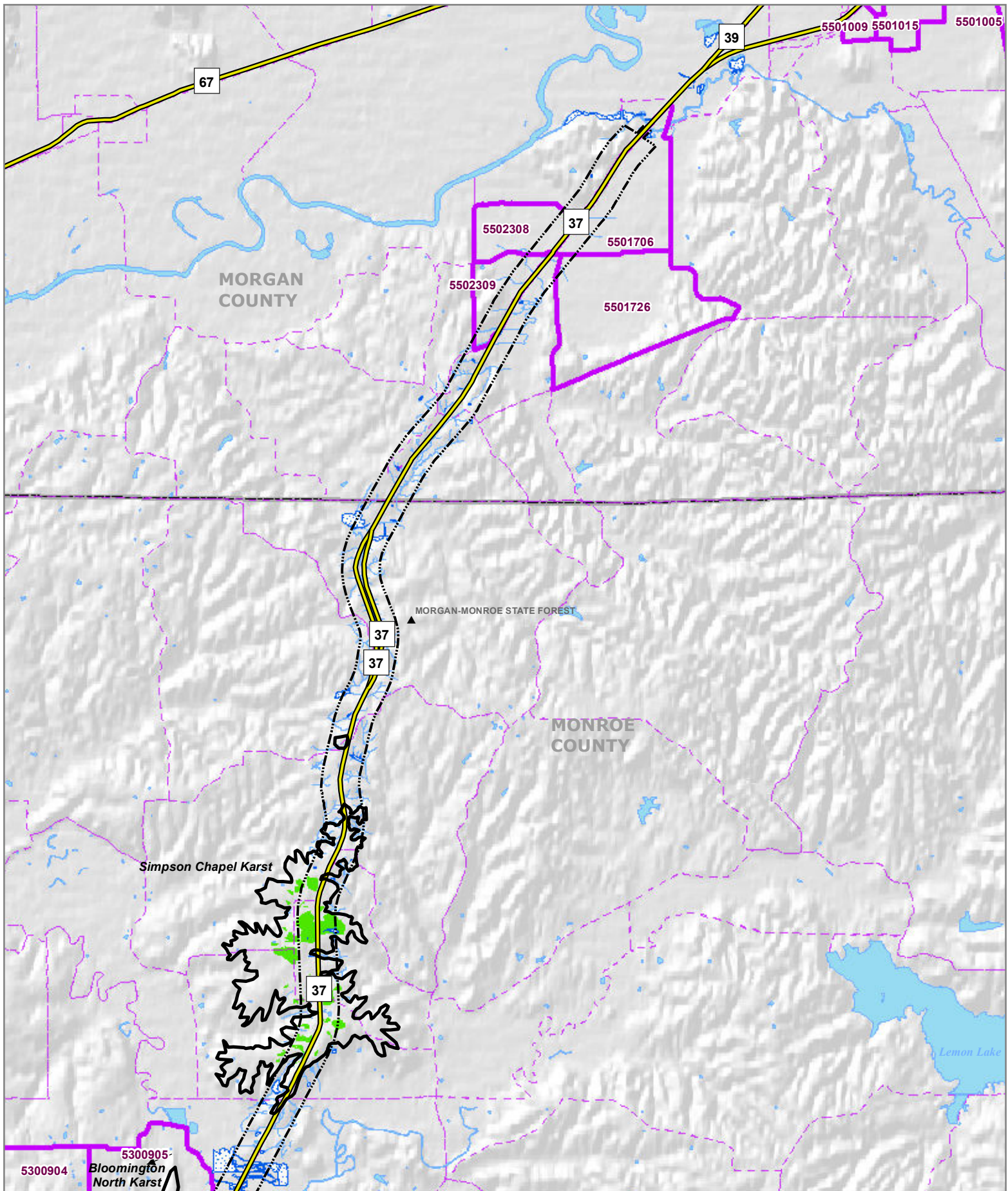


Figure 5.24-6B: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Environmental Features - Alternative 5, 7, DEIS Preferred Alternative 8 & Refined Preferred Alternative 8

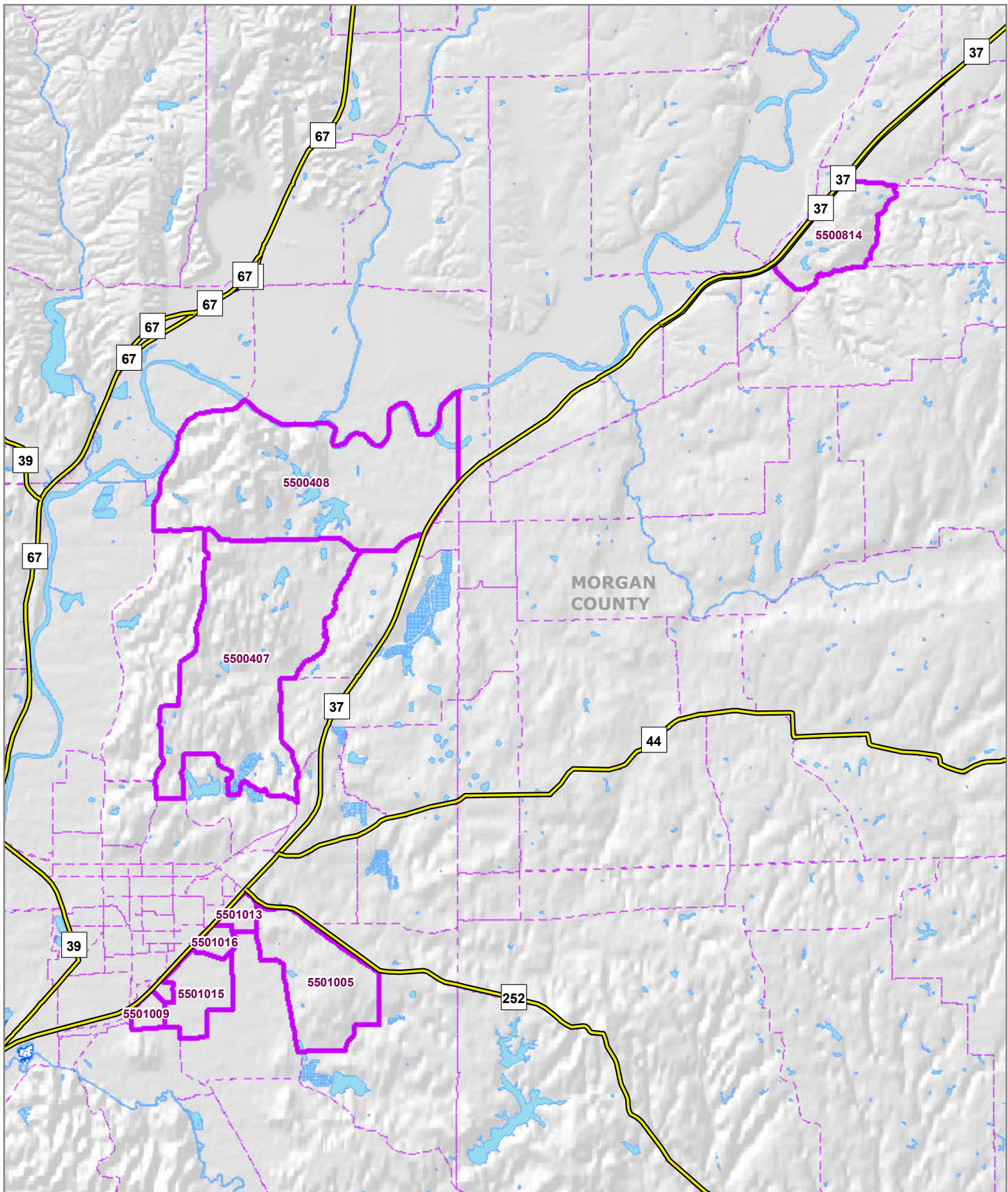




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|---------------------|---------------|-----------------------|---|
| 2,000-foot Corridor | Wetlands | Relevant Karst Area | Traffic Analysis Zone (TAZ) Boundary without Induced Growth |
| County | Lakes / Ponds | Sinkhole Areas | Traffic Analysis Zone (TAZ) Boundary with Induced Growth |
| Primary Roads | Streams | Sinking Stream Basins | |

Figure 5.24-6B: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Environmental Features - Alternative 5, 7, DEIS Preferred Alternative 8 & Refined Preferred Alternative 8

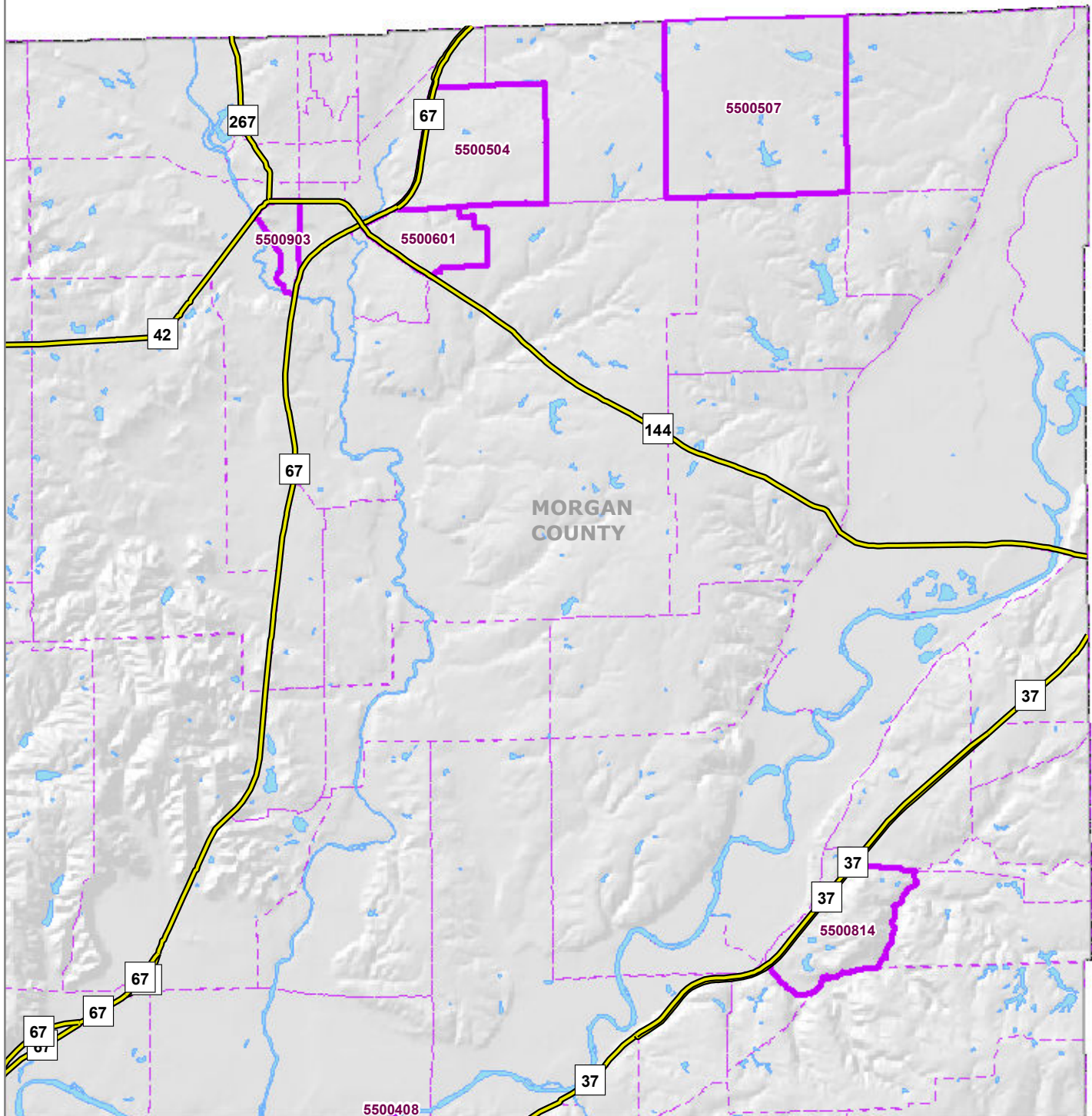




- | | | | |
|---------------------|---------------|-----------------------|---|
| 2,000-foot Corridor | Wetlands | Relevant Karst Area | Traffic Analysis Zone (TAZ) Boundary without Induced Growth |
| County | Lakes / Ponds | Sinkhole Areas | Traffic Analysis Zone (TAZ) Boundary with Induced Growth |
| Primary Roads | Streams | Sinking Stream Basins | |

Figure 5.24-6B: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Environmental Features - Alternative 5, 7, DEIS Preferred Alternative 8 & Refined Preferred Alternative 8





- | | | | |
|---------------------|---------------|-----------------------|---|
| 2,000-foot Corridor | Wetlands | Relevant Karst Area | Traffic Analysis Zone (TAZ) Boundary without Induced Growth |
| County | Lakes / Ponds | Sinkhole Areas | Traffic Analysis Zone (TAZ) Boundary with Induced Growth |
| Primary Roads | Streams | Sinking Stream Basins | |

Figure 5.24-6B: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Environmental Features - Alternative 5, 7, DEIS Preferred Alternative 8 & Refined Preferred Alternative 8



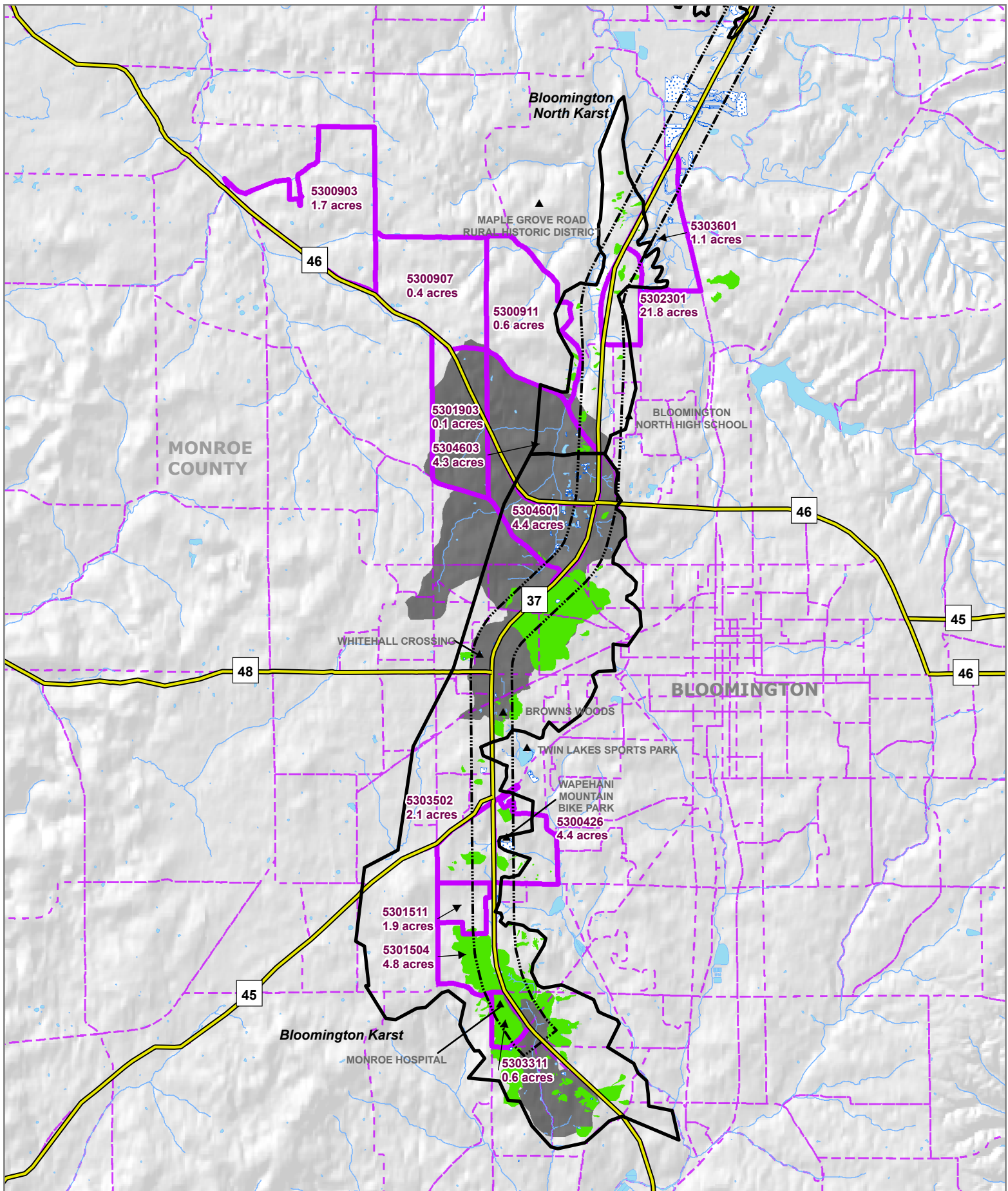


Figure 5.24-6C: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Environmental Features - Alternative 6



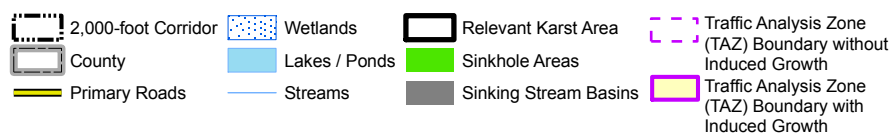
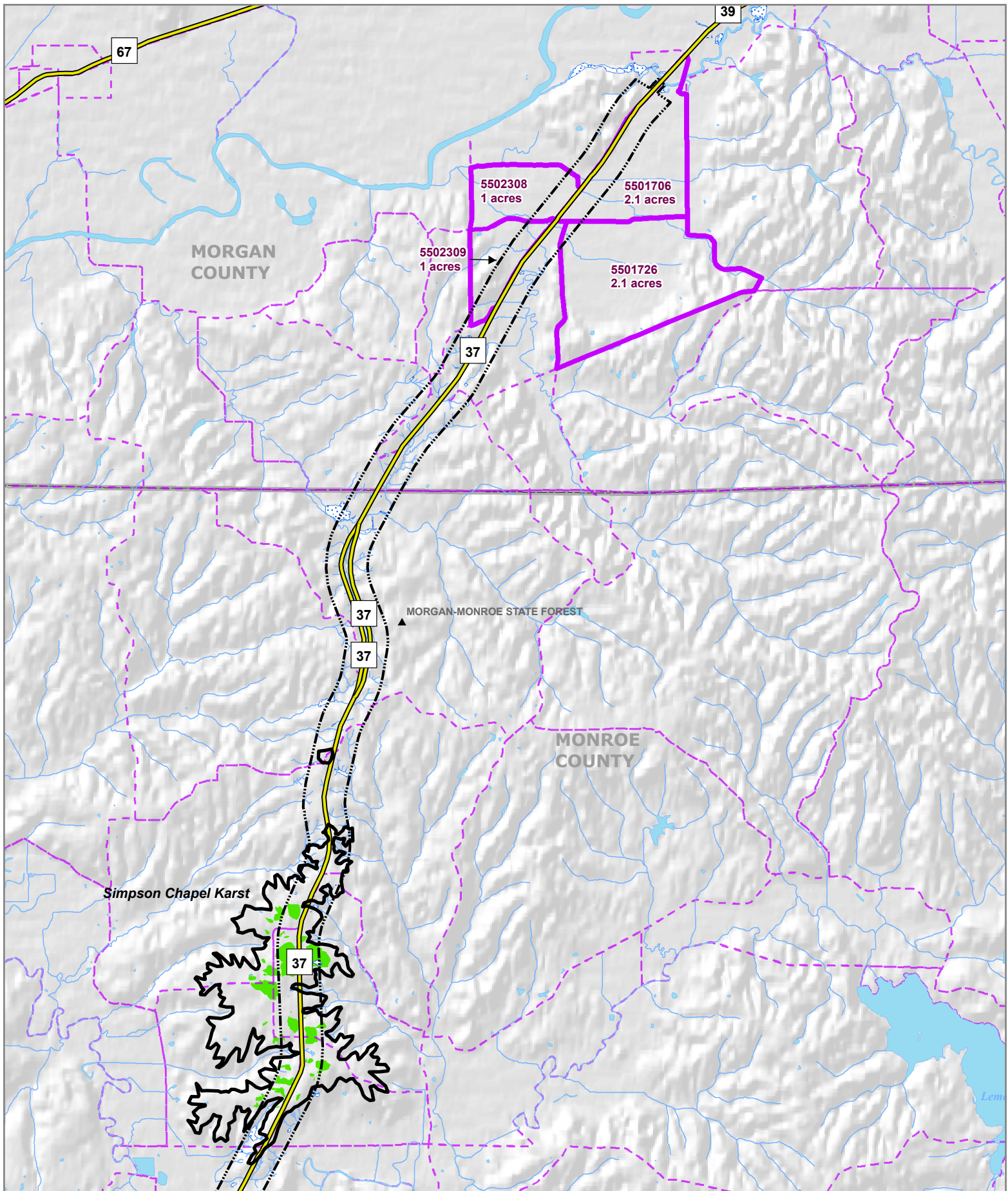


Figure 5.24-6C: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Environmental Features - Alternative 6



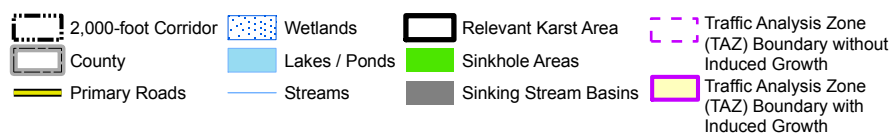
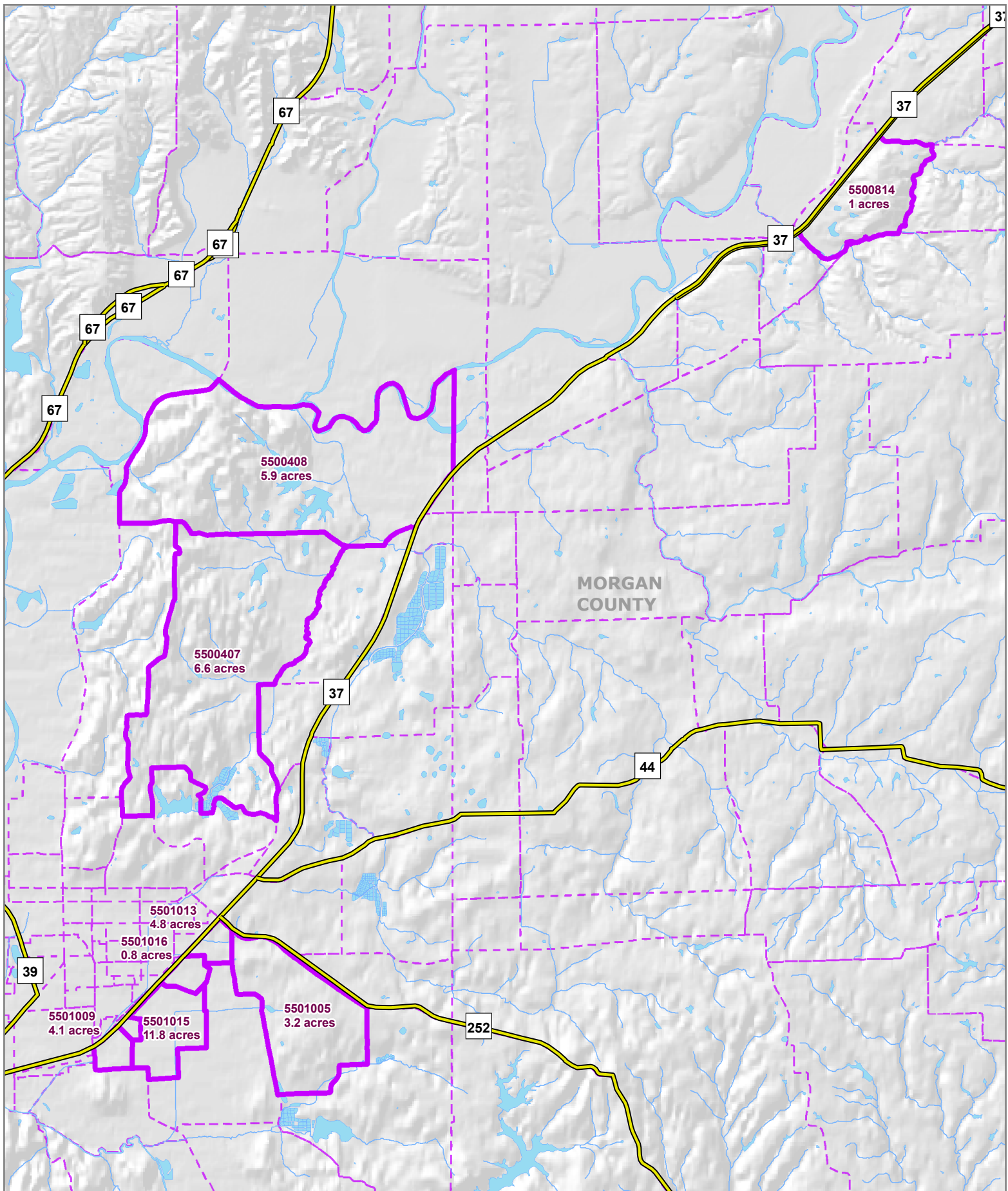
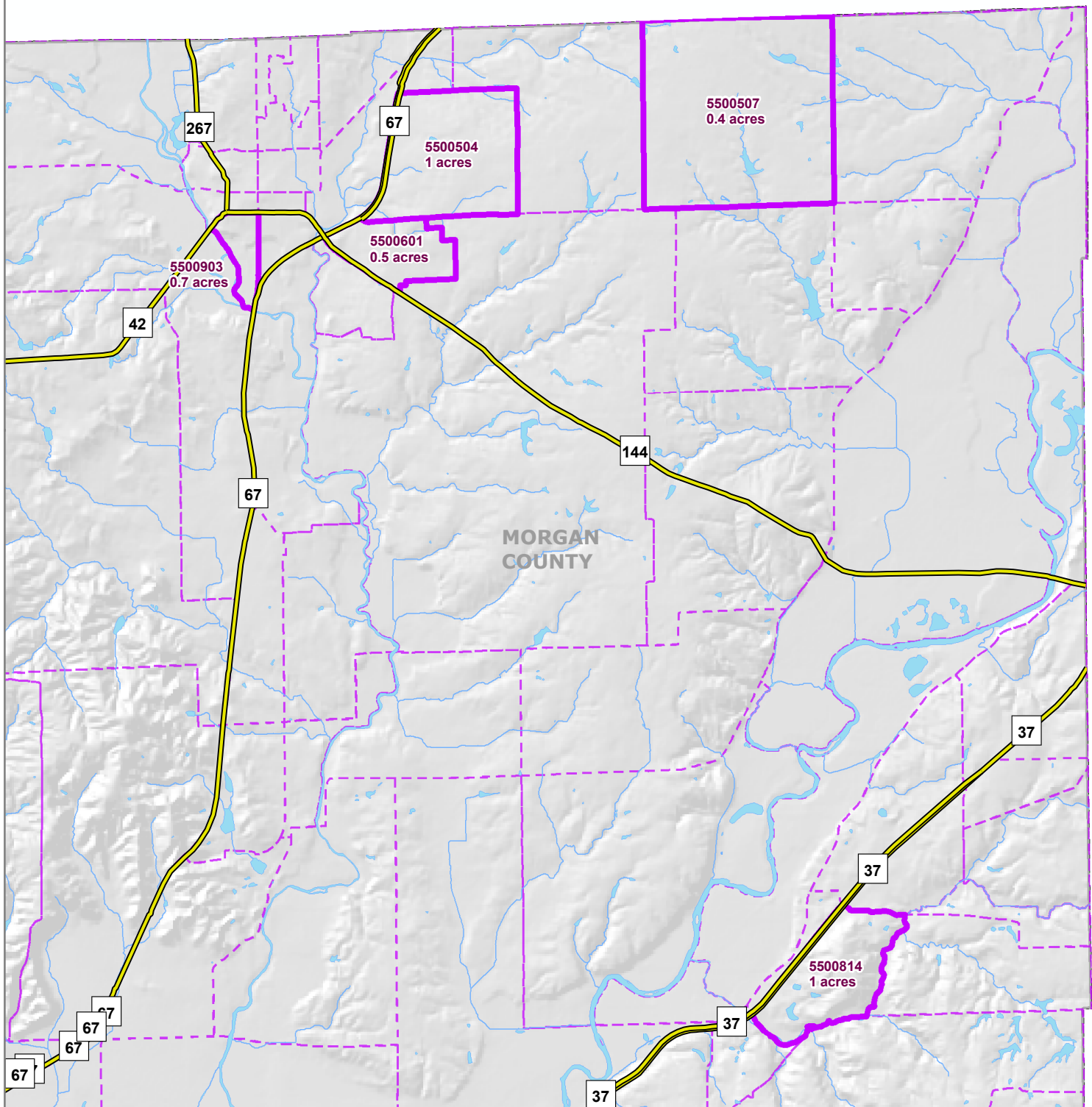


Figure 5.24-6C: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Environmental Features - Alternative 6

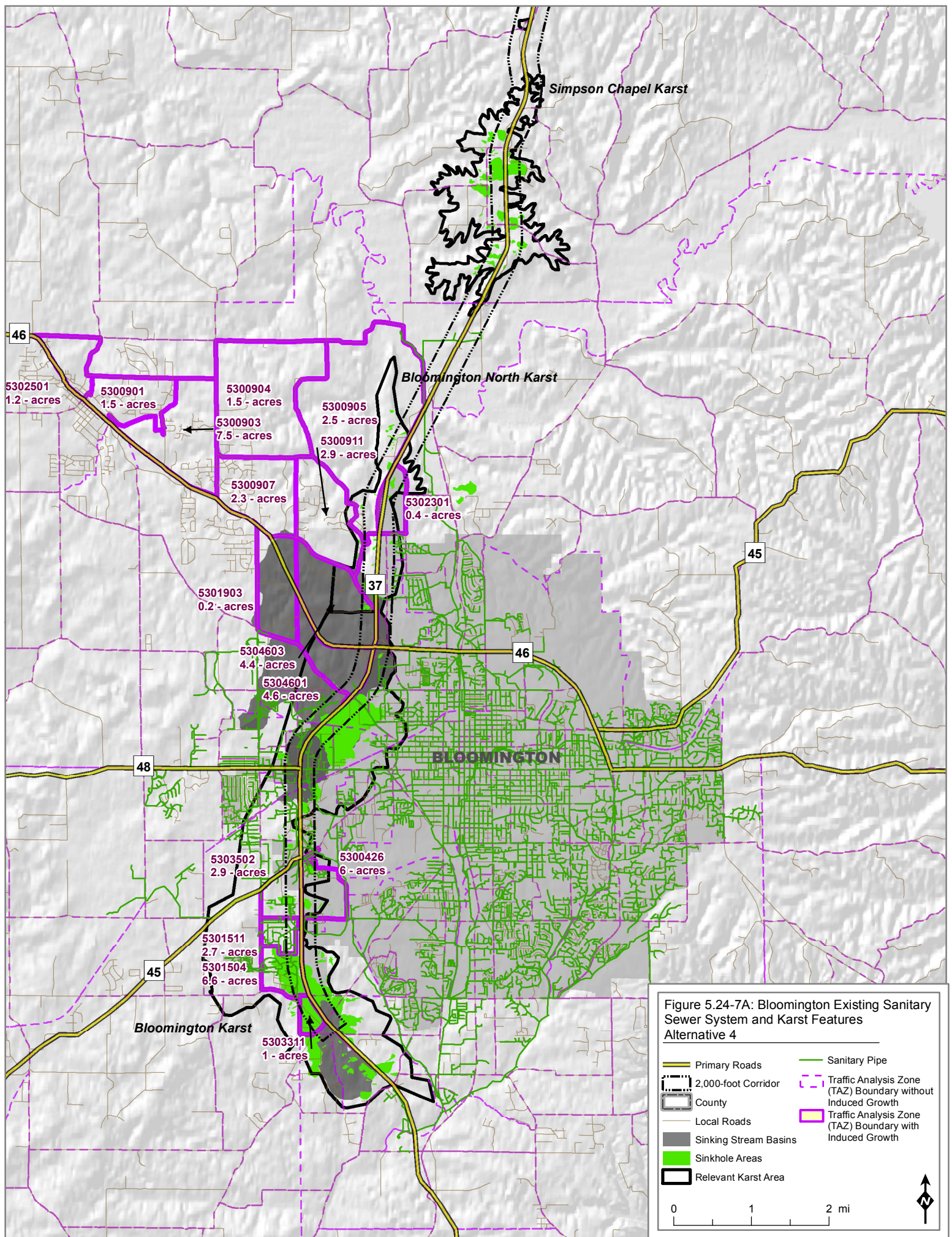


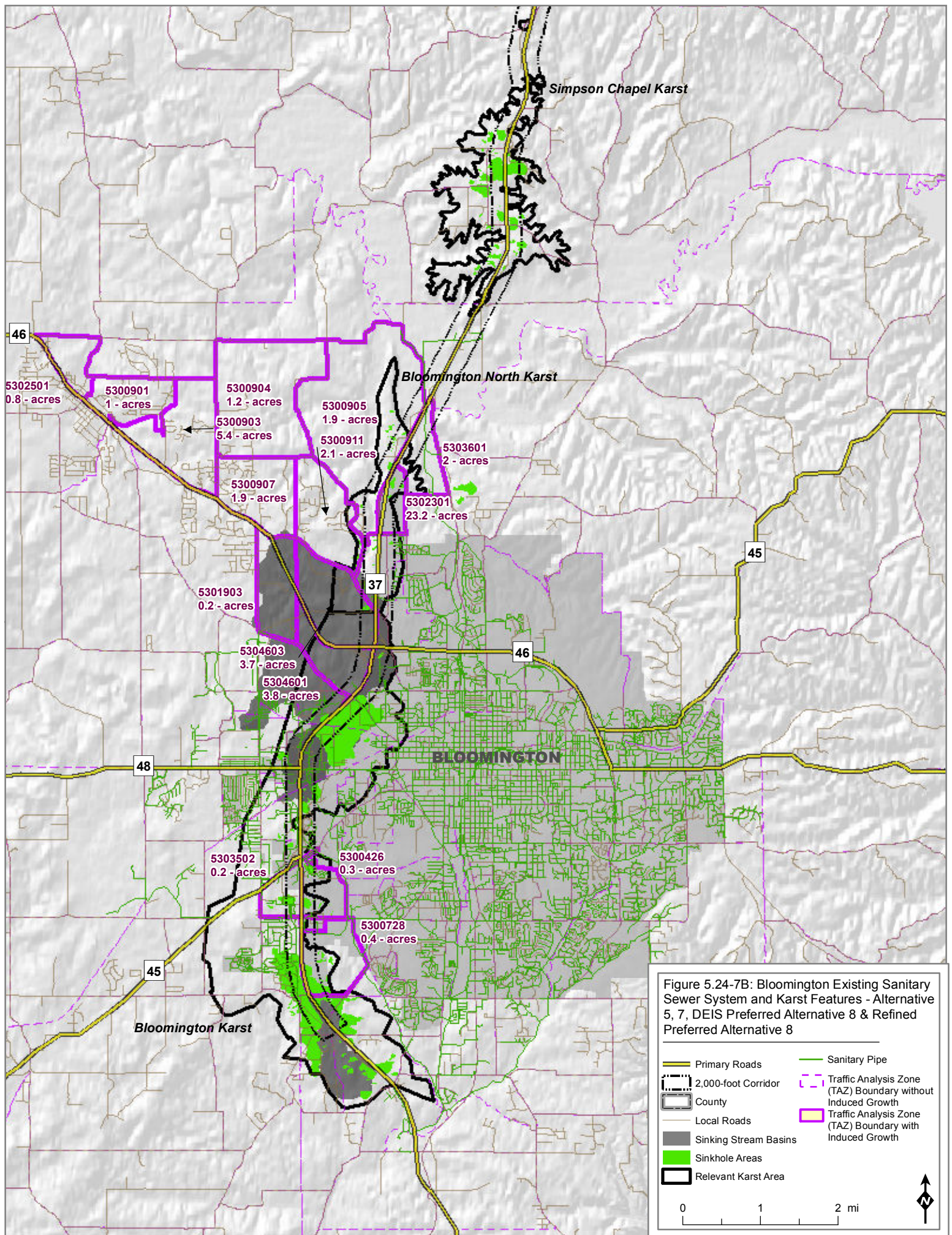


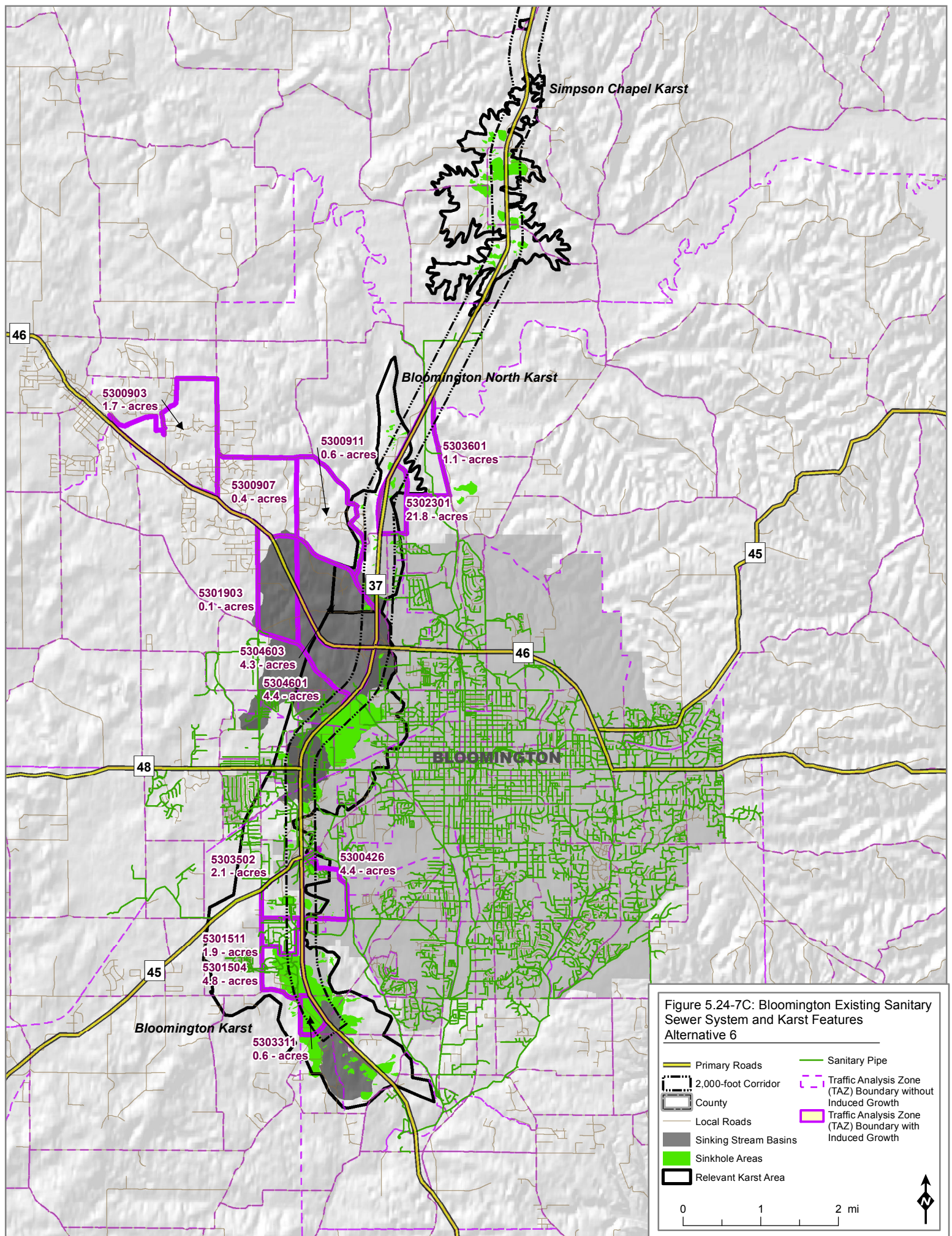
- | | | | |
|---------------------|---------------|-----------------------|---|
| 2,000-foot Corridor | Wetlands | Relevant Karst Area | Traffic Analysis Zone (TAZ) Boundary without Induced Growth |
| County | Lakes / Ponds | Sinkhole Areas | Traffic Analysis Zone (TAZ) Boundary with Induced Growth |
| Primary Roads | Streams | Sinking Stream Basins | |

Figure 5.24-6C: Tier 2 Analysis of Indirect Land Use Changes Resulting from I-69 and Environmental Features - Alternative 6









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5.25 Energy Impacts

Since the publishing of the Draft Environmental Impact Statement (DEIS), the following substantive change has occurred to this section:

- The Indiana Statewide Travel Demand Model Version 6.2 was finalized, and the I-69 Corridor Model was updated to incorporate its forecasts. The values in **Table 5.25-1** were changed to reflect the updated models.

5.25.1 Introduction

Transportation accounts for a major portion of energy consumption in the United States. Energy is directly consumed by vehicles traveling on roadways and is indirectly consumed by vehicle manufacture and maintenance as well as by roadway construction and maintenance. Energy consumption for vehicle operation and roadway facility maintenance represents long-term energy impacts; whereas, energy consumption in new road construction is a substantial short-term energy impact.

Studies show that 42% of the energy for transportation is consumed in the manufacture and maintenance of transportation vehicles (Hatano et al., 1983). Most of the remainder of the energy consumed by transportation projects involves ongoing vehicle operation, in contrast to the transportation facility construction and maintenance. Therefore, the energy impacts analysis focuses on direct energy consumption associated with vehicle travel.

5.25.2 Methodology

In the evaluation of the future No Build Condition and the Build Condition (Alternatives 4, 5, 6, 7, 8 and Refined Preferred Alternative 8), a “postprocessor” program was used to analyze the travel characteristics forecasted by the I-69 Corridor Travel Demand Model. The Travel Demand Model replicates travel patterns for the No Build Condition and Alternatives and reports daily automobile and truck volumes, daily vehicles-miles of travel, and typical vehicle speeds for each link in the highway system. The “postprocessor” program converts these travel characteristics into gallons of gasoline and diesel fuel consumed in the year 2035. Factors were then used to convert gallons of fuel to British Thermal Units (BTUs) to assess energy impacts. One million BTUs are approximately equal to 8.007 gallons of gasoline or to 7.201 gallons of diesel fuel. For the purposes of this analysis, it was assumed that passenger cars and light-duty trucks consume gasoline and that heavy-duty trucks consume diesel fuel.

Also for purposes of analysis, fuel consumption efficiency rates by vehicle and travel type were held constant due to the difficulties inherent in attempting to predict changes in efficiency. It is expected that efficiency rates would improve over time, however.

All of the Build Alternatives follow very similar mainline alignments along existing SR 37, and all alternatives have a total end-to-end distance of about 21.1 miles. It was assumed that minor alignment differences would have a negligible effect upon energy consumption, given the millions of vehicle miles of travel (VMT) and gallons of fuel that are consumed annually within

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the two-county study area. Thus, the Travel Demand Model used one mainline alignment following existing SR 37 and near the center of the Section 5 corridor to replicate travel along the new highway for all Section 5 alternatives.

5.25.3 Analysis

Table 5.25-1 reports the results of the energy analysis for the future No Build Condition and the end-to-end Alternatives 4, 5, 6, 7, 8, and Refined Preferred Alternative 8 under the Build Condition. Due to the additional lane miles that each alternative will add to the roadway network and the diversion of through traffic from other interstates and principal arterials, each of the alternatives will result in an increase in annual VMT over the future No Build Condition. The future No Build Condition assumes the following: the first four Tier 2 sections (Sections 1 through 4) are completed for I-69 between Evansville and Bloomington, and the section of I-69 from Henderson, Kentucky, to Evansville, Indiana (SIU #4 of the National I-69 project) is completed. The future No Build Condition does not upgrade SR 37 between Bloomington and Indianapolis to a freeway and only assumes routine maintenance projects along SR 37. The future No Build Condition perpetuates the existing SR 37 scenario of at-grade intersections (signalized and unsignalized roadways, as well as residential and commercial drives), interspersed with interchanges. All of the “Build Alternatives” eliminate those at-grade access points, since access to the interstate is only provided via interchanges.

Because the alternatives, including Refined Preferred Alternative 8, have nearly identical total end-to-end distances, all six alternatives will have nearly identical results for annual VMT, daily fuel consumption, annual BTUs, and BTUs per VMT. As shown in **Table 5.25-1**, the Build Alternatives would result in an increase of 244 million annual VMT for Morgan and Monroe counties. This is an increase of about 10% over the No Build Condition of 2,408 million. Due to the increase in VMT, the amount of daily fuel consumption would increase by 127,100 gallons, an almost 24% daily increase over the No Build Condition of 531,800 gallons. In addition, the amount of energy expended would also increase by 5,575,700 million annual BTUs with the Build Alternatives, a 24% annual increase over the No Build Condition of 23,249,100 million. The amount of BTUs per VMT would increase with the Build Alternatives by 1,200 BTUs per VMT, an increase of 12.2% for both Morgan and Monroe counties over the No Build Condition of 9,700 BTUs per VMT.

**Table 5.25-1: Energy Consumption in the Year 2035 by Alternative**

Alternatives	County	Annual VMT (in millions)	Daily Fuel Consumption (in gallons)	Annual BTUs (in millions)	BTUs / VMT
No Build Condition	Monroe	1,416	262,800	11,371,000	8,000
	Morgan	992	269,000	11,878,100	12,000
	Total	2,408	531,800	23,249,100	9,700
Alternatives 4, 5, 6, 7, 8 and Refined Preferred Alternative 8 (Build Condition)	Monroe	1,534	318,000	13,793,800	9,000
	Morgan	1,118	340,900	15,031,000	13,400
	Total	2,652	658,900	28,824,800	10,900
% Change Over No Build	<i>Monroe</i>	<i>8.3</i>	<i>21.0</i>	<i>21.3</i>	<i>12.0</i>
	<i>Morgan</i>	<i>12.7</i>	<i>26.7</i>	<i>26.5</i>	<i>12.3</i>
	Total	10.1	23.9	23.9	12.2

5.25.4 Summary

Because of the increase in roadway miles and the diversion of through traffic from outside the I-69 corridor, all six alternatives for the Build Condition, including Preferred Alternative 8, will result in greater total VMT than the No Build Condition. The more effective an alternative is in attracting travel in a particular county, the greater the energy consumption. The predictions for the Build Alternatives indicate that they will have nearly identical results for annual VMT, daily fuel consumption, annual BTUs, and BTUs per VMT, making them virtually equal in the amount of energy consumption.



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5.26 Short-Term Uses Versus Long-Term Productivity

For purposes of this section, Preferred Alternative 8 that was identified in the Draft Environmental Impact Statement (DEIS) will be referred to as “Alternative 8.” The Preferred Alternative for the Final Environmental Impact Statement (FEIS) will be referred to as the “Refined Preferred Alternative 8.”

Since the publishing of the DEIS, the following substantive change has occurred to this section:

- The Indiana Department of Transportation’s Long-Range Transportation Plan information was updated to the *2013-2035 Future Transportation Needs Report*.

This chapter discusses the short-term, direct impacts and resulting long-term productivity. For a discussion of the indirect and cumulative impacts, refer to **Section 5.24, *Indirect and Cumulative Impacts***. The short-term uses associated with construction of I-69 are typical of highway construction and would be very similar among all of the Section 5 Build Alternatives. Adverse impacts on air and water, poor aesthetics, and displacements may result from this project. Additionally, highway construction involves noise, air pollution (especially dust), erosion, sedimentation, and local degradations in water quality. The appearance of construction machinery and the disturbed landscape created during construction would be aesthetically displeasing to persons in the area, and disruptions in traffic flow due to construction staging could be a temporary inconvenience to the local community. Individuals would be displaced from the right-of-way, and businesses depending on drive-by traffic on local roads could lose customers as traffic diverts to the interstate. Also, demand for raw materials for highway construction could lead to increased costs of those materials in the short-term.

Mitigation for these impacts is considered in this FEIS and included where effective and practicable. As noted in previous sections, Best Management Practices (BMPs) would be employed during construction to minimize impacts to the environment, and relocation assistance would be available to those being displaced. Traffic plans would be coordinated with the local governments and emergency services in order to maintain the transportation needs of the local community during construction. Long-term positive outcomes for the public good that would have a mitigation effect include the increased aesthetics of the roadway and benefits to businesses as a result of an improved transportation network for shipping goods.

Regarding long-term productivity, loss of agricultural land to right-of-way would be a permanent loss of agricultural production on that land. See **Table 5.4-6** for impacts to agricultural land. The Refined Preferred Alternative 8 also would result in 119 residential displacements. Most, if not all, displaced residents would be able to relocate in the general area from which they are being displaced. See **Section 5.2, *Social Impacts***, for further details. In the long run, new residents would be expected to locate in the communities served by the new roadway, as a result of an improved transportation network and jobs created from anticipated economic development.

One of the main components of the purpose of the I-69 project, as noted in **Chapter 2, *Purpose and Need***, is to provide an improved transportation link between Evansville and Indianapolis that



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supports economic development in Southwest Indiana. The Tier 1 FEIS analysis showed that the project would result in an additional 4,600 jobs and over \$170 million in added annual personal income (see Tier 1 FEIS, Table 3-25) with 560 of these jobs and \$18 million of the annual income increase in Monroe County alone (Tier 1 FEIS, Table 3-25b). This economic development is due to the long-term productivity afforded by the reduction in the costs of production and shipping, as well as increases in accessibility due to the improved transportation network.

Transportation improvements are based on state and local comprehensive plans that consider present and future traffic requirements within the context of present and future land use development. The local short-term impacts and use of resources by the project are consistent with the maintenance and enhancement of long-term productivity for the local area, the state, and—as a link in the I-69 National Corridor—the region. These long term productivity goals are expressed in the Indiana Department of Transportation’s Long-Range Transportation Plan entitled *2013-2035 Future Transportation Needs Report* and in the Tier 1 FEIS.

The chief long-term benefits of the project are defined by the project’s Purpose and Need, as described in **Chapter 2, Purpose and Need**. Two of three distinct elements of the purpose of this project are “strengthen the transportation network” and “support economic development” in Southwest Indiana. The improvements that result from the completion of Section 5 of I-69 would fulfill the purpose of this project by supporting long-term productivity.



5.27 Irreversible or Irretrievable Commitment of Resources

No substantive changes have been made to this section since publication of the Draft Environmental Impact Statement (DEIS).

Implementing the project involves a commitment of a range of natural, human, and fiscal resources. When land becomes developed for a use other than its natural state, such as a highway facility, an irreversible commitment is made for that land. If a greater need arises for use of the land or if the highway facility is no longer needed, the land can be converted to other uses but will most likely never return to its original state. At present, it is believed that this land will remain as a highway facility for the foreseeable future.

In addition to the conversion of land into a highway facility, indirect impacts to land use are also anticipated. Indirect impacts include the conversion of farmland and forest land to commercial, residential, and other uses as a result of an improved transportation network. This will be especially noticeable near the new interchange locations including Fullerton Pike, Tapp Road, Sample Road, and Liberty Church Road. **Section 5.24, *Indirect and Cumulative Impacts***, describes these impacts in more depth.

Considerable amounts of fossil fuels, labor, and highway construction materials such as cement, aggregate, and bituminous material will be committed to the construction of this project. Additionally, large amounts of human labor and energy resources will be used in the fabrication and preparation of construction materials. These labor and materials are generally irretrievable. However, these resources are not in short supply, and their use will not have an adverse effect on the continued availability of these resources. Any construction will also require a substantial one-time expenditure of both state and federal funds, which are irretrievable.

As was communicated in **Section 5.26, *Short-Term Uses Versus Long-Term Productivity***, the commitment of these resources, which are irretrievable, will result in benefits to the residents in the immediate area, state, and region from the improved quality of the transportation system. Benefits, as described in **Chapter 2, *Purpose and Need***, will consist of reducing existing and forecasted traffic congestion, improving traffic safety, and supporting local economic development initiatives. Realized benefits are anticipated to outweigh the commitment of these resources.

The alignment for Refined Preferred Alternative 8 has been developed using a broad design approach. Consideration will be given during the subsequent and more detailed design phase for use of design refinements as a measure to reduce direct impacts and/or construction costs (see **Section 5.1, *Introduction and Methodology***). Potential impacts upon the irreversible or irretrievable commitment of resources were determined per the development of Refined Preferred Alternative 8 based on the initial design criteria and its associated right-of-way.



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